# Operation Manual
# CT100 Series Inverter


Document version: V1.0

# Content

# 1 Safety precautions

Please read this manual carefully and follow all safety precautions before installing, debugging, maintaining and repairing the inverter.
If any physical injury or death or damage to the devices occurs for ignoring to the safety precautions in the manual, our company will not be responsible for any damages and we are not legally bound in any manner.
Following the warning symbols are used in this manual:


Danger Serious physical injury or even death may occur if not follow the relative requirements.


Warning Physical injury or damage to the devices may occur if not follow the relative requirements.

## 1.1 Safety guidelines

### 1.1.1 Before installation

| |
|---|
|  Danger |
| » Do not operate the inverter if there are any signs of water in the inverter when unpacking.<br>» Do not operate the inverter if there is any damage or components loss to the inverter when unpacking. Otherwise, physical injury or damage to the devices may occur.<br>» Do not touch the control terminals, PCB board or components inside the inverter with hands or body. |
|  Warning |
| » Do not operate the inverter if the packing list is not consistent with the devices.<br>» Do not operate the inverter if the information on the type designation label is not consistent with your order. |

### 1.1.2 Installation

| |
|---|
|  Danger |

» Only qualified electricians are allowed to perform the installation, otherwise electric shock may occur.
» Please install the inverter on fire-retardant materials and keep the inverter away from combustible materials, otherwise a fire may occur.
» Please assemble and tighten the mounting screws of the inverter according to the regulations, otherwise the inverter may fall off.
» Do not install the inverter in explosive atmospheres, otherwise an explosion may occur.


Warning

» Handle the inverter with care to prevent it falls off and thus causes injury to your feet or device damage.
» Keep the inverter away from the places with large vibrations, water drops and direct sunlight.
» When installing the inverter in the cabinet, especially if two or more inverters are installed in a cabinet, please pay attention to the installation space and ventilation.
» Take measures to avoid screws, cables and other conductive matters fall into the inverter during installation.

## 1.1.3 Wiring


Danger

» Only qualified electricians are allowed to perform the wiring, otherwise electric shock or device damage may occur.
» Carry out wiring strictly in accordance with this manual, otherwise there is a risk of electric shock or device damage.
» Ensure all input power supply is disconnected before wiring, otherwise electric shock may occur.
» Please select all cables, circuit breakers and contactors meeting the national standards as required by the manual.
» The inverter must be grounded reliably, otherwise electric shock may occur.
» Carry out wiring strictly in accordance with the silk printing instructions and avoid connecting the input and output wires reversely, otherwise the damage to the devices may occur.


Warning

» Keep the signal cables of the inverter away from the power cables as far as possible, or distribute the two categories of cables vertically-crossed if the distance is not far enough, otherwise it may cause signal interference.

» Ensure that all the screws are tightened when wiring, otherwise damage to the inverter may occur.

» The encoders and sensors should be applied with the shielded cables and the shielded layer should be grounded reliably.

### 1.1.4 Operation


Danger

» Confirm that the wiring is completed and correct and then cover the plate before power on.

» Do not open the plate after power on, otherwise electric shock may occur.

» Operate the inverter appropriately, otherwise damage to the inverter may occur.

» Non-professionals are not allowed to test the signals when the inverter is running. Otherwise, physical injury or damage to the devices may occur.

» Do not change the parameters of the inverter at random, otherwise damage to the inverter may occur.


Warning

» Do not touch the fans and brake resistors, otherwise it may cause mechanical injury or burn.

» Do not start up or stop the inverter by power on or off, otherwise damage to the inverter may occur.

» Ensure that the circuit breakers or contactors at the output sides of the inverter are not in output state before switching, otherwise damage to the inverter may occur.

# 1.2 Others


» This inverter is not suitable for the occasions when the specifications exceed those specified in this manual. If you have special requirements, please contact our technical department.

» The inverter is equipped with surge suppressors inside, which can protect it from the lightning. It is necessary to mount external surge suppressors at the power input side of the inverter in high lightning incidence areas.

» When the conductors between the inverter and the motor exceed 100m, it is recommended to mount the output reactors to avoid overcurrent caused by excessive distributed capacitance.

» Do not mount the compensation capacitors and the surge absorbers at the output sides of the inverter. Otherwise, it may cause damage to the inverter due to overheating.

» Mounting the input or output reactors, special filters and magnetic rings at the input or output sides of the inverter can effectively reduce the noise and thus avoid interference to other devices.

» Non-professionals are not allowed to perform withstand voltage tests on the inverter, , otherwise damage to the inverter may occur.

» Deal with the devices as industrial effluent after scrapping. Burning is strictly prohibited, otherwise an explosion may occur.

» The cooling effect of the inverter is reduced and the electrolytic capacitor electrolyte is also volatile in high altitude areas, which will shorten the life of the inverter. Check the altitude of the actual usage site is below 1000m. If exceeds, derate 1% for every additional 100m.

# 2 Product overview

## 2.1 Type designation key and name plate

### 2.1.1 Type designation key

The letters and numbers of the type designation key indicate that the product series, voltage, power, load etc.

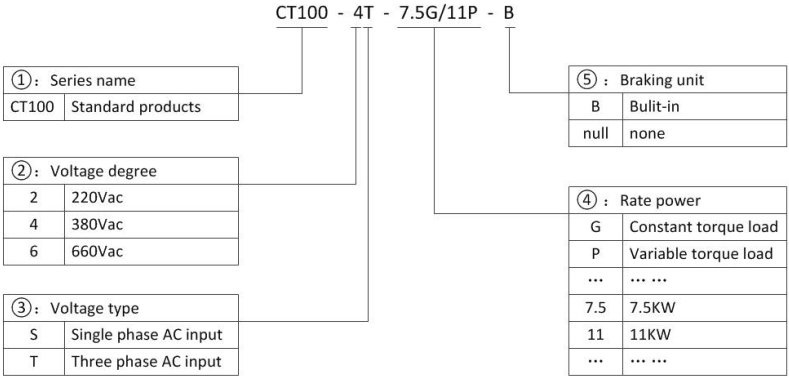



Figure 2-1 Type designation key

### 2.1.2 Name plate

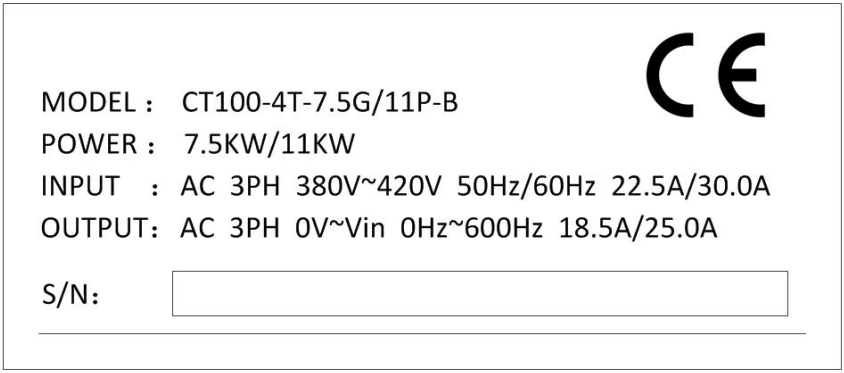



Figure 2-2 Product name plate

## 2.2 Product specifications and technical parameters

### 2.2.1 Product specifications

Table 2-1 Product Specifications

| Inverter model | Power (kW) | Input current (A) | Output current (A) | Applicable motor power (kW) |
|---|---|---|---|---|
| Single-phase 220Vac 50/60Hz | | | | |
| CT100-2S-0.7G-B | 0.75 | 8.2 | 4.5 | 0.75 |
| CT100-2S-1.5G-B | 1.5 | 14.0 | 7.0 | 1.5 |
| CT100-2S-2.2G-B | 2.2 | 23.0 | 9.6 | 2.2 |
| Three-phase 380Vac 50/60Hz | | | | |
| CT100-4T-0.7G-B | 0.75 | 3.4 | 2.5 | 0.75 |
| CT100-4T-1.5G-B | 1.5 | 5.0 | 3.7 | 1.5 |

| | | | | |
|---|---|---|---|---|
| CT100-4T-2.2G-B | 2.2 | 5.8 | 5.3 | 2.2 |
| CT100-4T-4.0G/5.5P-B | 4.0 | 12.0 | 9.5 | 4.0 |
| | 5.5 | 18.5 | 14 | 5.5 |
| CT100-4T-5.5G/7.5P-B | 5.5 | 18.5 | 14 | 5.5 |
| | 7.5 | 22.5 | 18.5 | 7.5 |
| CT100-4T-7.5G/11P-B | 7.5 | 22.5 | 18.5 | 7.5 |
| | 11 | 30.0 | 25.0 | 11 |
| CT100-4T-11G/15P-B | 11 | 30.0 | 25.0 | 11 |
| | 15 | 39.0 | 32.0 | 15 |
| CT100-4T-15G/18.5P-B | 15 | 39.0 | 32.0 | 15 |
| | 18.5 | 45.0 | 38.0 | 18.5 |
| CT100-4T-18.5G/22P-B | 18.5 | 45.0 | 38.0 | 18.5 |
| | 22 | 54.0 | 45.0 | 22 |
| CT100-4T-22G/30P-B | 22 | 54.0 | 45.0 | 22 |
| | 30 | 68.0 | 60.0 | 30 |
| CT100-4T-30G/37P-B | 30 | 68.0 | 60.0 | 30 |
| | 37 | 84.0 | 75.0 | 37 |
| CT100-4T-37G/45P-B | 37 | 84.0 | 75.0 | 37 |
| | 45 | 98.0 | 92.0 | 45 |
| CT100-4T-45G/55P | 45 | 98.0 | 92.0 | 45 |

| | | | | |
|---|---|---|---|---|
| | 55 | 123.0 | 115.0 | 55 |
| CT100-4T-55G/75P | 55 | 123.0 | 115.0 | 55 |
| | 75 | 157.0 | 150.0 | 75 |
| CT100-4T-75G/90P | 75 | 157.0 | 150.0 | 75 |
| | 90 | 188.0 | 180.0 | 90 |
| CT100-4T-90G/110P | 90 | 188.0 | 180.0 | 90 |
| | 110 | 221.0 | 215.0 | 110 |
| CT100-4T-110G/132P | 110 | 221.0 | 215.0 | 110 |
| | 132 | 267.0 | 260.0 | 132 |
| CT100-4T-132G/160P | 132 | 267.0 | 260.0 | 132 |
| | 160 | 309.0 | 305.0 | 160 |
| CT100-4T-160G/185P | 160 | 309.0 | 305.0 | 160 |
| | 185 | 344.0 | 340.0 | 185 |
| CT100-4T-185G/200P | 185 | 344.0 | 340.0 | 185 |
| | 200 | 384.0 | 380.0 | 200 |
| CT100-4T-200G/220P | 200 | 384.0 | 380.0 | 200 |
| | 220 | 429.0 | 425.0 | 220 |
| CT100-4T-220G/250P | 220 | 429.0 | 425.0 | 220 |
| | 250 | 484.0 | 480.0 | 250 |
| CT100-4T-250G/280P | 250 | 484.0 | 480.0 | 250 |

| | | | | |
|---|---|---|---|---|
| | 280 | 539.0 | 530.0 | 280 |
| CT100-4T-280G/315P | 280 | 539.0 | 530.0 | 280 |
| | 315 | 612.0 | 600.0 | 315 |
| CT100-4T-315G/355P | 315 | 612.0 | 600.0 | 315 |
| | 355 | 665.0 | 650.0 | 355 |
| CT100-4T-355G | 355 | 665.0 | 650.0 | 355 |
| CT100-4T-400G | 400 | 715 | 720 | 400 |
| CT100-4T-500G | 500 | 890 | 860 | 500 |
| CT100-4T-630G | 630 | 1224 | 1200 | 630 |
| CT100-4T-710G | 700 | 1330 | 1300 | 700 |
| CT100-4T-800G | 800 | 1460 | 1440 | 800 |
| CT100-4T-1000G | 1000 | 1760 | 1720 | 1000 |
| Three-phase 660Vac 50/60Hz | | | | |
| CT100-6T-22 | 22 | 38 | 28 | 22 |
| CT100-6T-30 | 30 | 40 | 35 | 30 |
| CT100-6T-37 | 37 | 47 | 45 | 37 |
| CT100-6T-45 | 45 | 55 | 52 | 45 |
| CT100-6T-55 | 55 | 65 | 63 | 55 |
| CT100-6T-75 | 75 | 85 | 86 | 75 |
| CT100-6T-90 | 90 | 95 | 98 | 90 |

| | | | | |
|---|---|---|---|---|
| CT100-6T-110 | 110 | 118 | 121 | 110 |
| CT100-6T-132 | 132 | 145 | 150 | 132 |
| CT100-6T-160 | 160 | 165 | 175 | 160 |
| CT100-6T-185 | 185 | 198 | 198 | 185 |
| CT100-6T-200 | 200 | 210 | 218 | 200 |
| CT100-6T-220 | 220 | 228 | 240 | 220 |
| CT100-6T-250 | 250 | 255 | 270 | 250 |
| CT100-6T-280 | 280 | 290 | 320 | 280 |
| CT100-6T-315 | 315 | 334 | 350 | 315 |
| CT100-6T-355 | 355 | 362 | 380 | 355 |
| CT100-6T-400 | 400 | 411 | 430 | 400 |
| CT100-6T-500 | 500 | 518 | 540 | 500 |
| CT100-6T-560 | 560 | 578 | 600 | 560 |
| CT100-6T-630 | 630 | 655 | 680 | 630 |
| CT100-6T-710 | 710 | 724 | 760 | 710 |
| CT100-6T-800 | 800 | 822 | 860 | 800 |
| CT100-6T-1000 | 1000 | 1036 | 1080 | 1000 |
| CT100-6T-1250 | 1250 | 1310 | 1360 | 1250 |

**Note:** 1. The inverters of power less than or equal to CT100-4T-37G/45P-B are built-in with braking units and braking resistors of power and resistance as required above the table, otherwise damage to the inverter may occur. The inverters of power more than or equal to CT100-4T-45G/55P are mounted with

external braking resistors and you need to purchase the resistors by yourselves.
2. The inverters of power between CT100-4T-18G/22P-B～CT100-4T-37G/45P-B are built-in with DC reactors. The inverters of power between CT100-4T-45G/55P～CT100-4T-315G/355P are mounted with external DC reactors and you need to purchase the reactors by yourselves. The inverters of power between CT100-4T-355G～CT100-4T-500G are applied with input AC reactors.
3. The above models are the standard general inverters, excluding the industrial special inverters. You can customize non-standard inverters of other specifications.

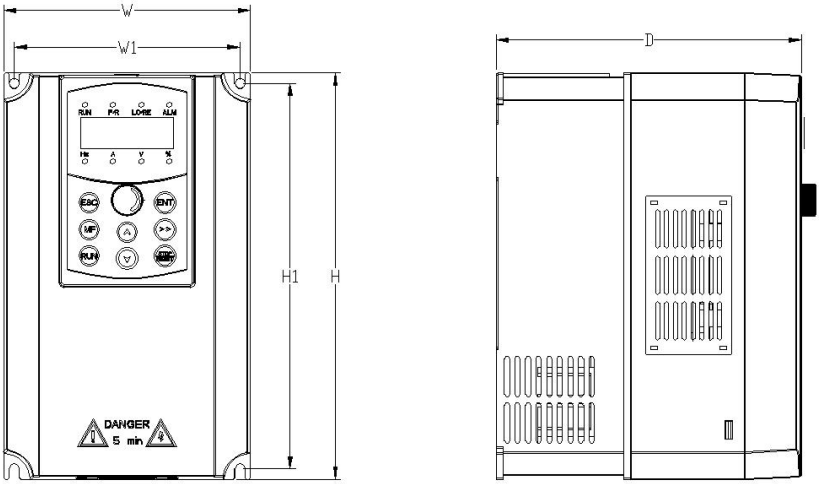
## 2.2.2 Technical parameters

Table 2-2 Technical parameters

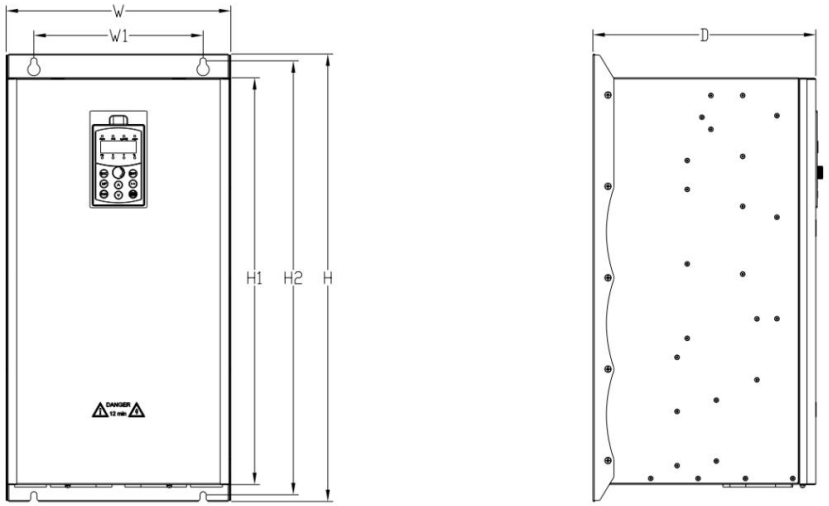
| | | |
|---|---|---|
| Input and output parameters | Input voltage | Single-phase 220VAC±15%,<br>three-phase 380VAC±15%,.<br>three-phase 660VAC±15%,. |
| | Input frequency | 50～60Hz±5% |
| | Output voltage | 0～Rated input voltage |
| | Output frequency | 0～600Hz |
| Technical control parameters | Control mode | V/F control, sensorless vector control, torque control |
| | Speed ratio | Open loop vector control 1: 100 |
| | Speed control accuracy | ±0.5% |
| | Starting frequency | 0.00～10.00Hz |
| | Overload capacity | 150% of rated current: 60s; 180% of rated current: 10s; 200% of rated current: 1s |
| | ACC and DEC time | 0.1～3000.0s |
| | Energy braking capacity | Operating voltage of braking unit: 320～750V |
| | DC braking capability | DC braking frequency: 0～300Hz;<br>DC braking waiting time: 0～50s;<br>DC braking current: 0.0～100.0%;<br>DC braking time: 0.0～50.0s; |
| | Frequency | Analog setting, high-speed pulse setting, |

| | | |
|---|---|---|
| | setting | multi-step speed setting, PID setting, 485 communication setting |
| | Auto voltage adjustment | Keep a stable voltage automatically when the grid voltage transients |
| | Speed tracking | Start the rotating motor smoothly |
| Control terminals | Digital input | Standard 8-channel inputs, one of which can be high-speed pulse input (HDI) |
| | Analog input | Standard 2-channel inputs, AI1: 0～10V or 4～20mA input optional, AI2: -10V～+10V input. |
| | Digital output | Standard 2-channel multi-function collector outputs, one of which can be high-speed pulse output (HDO). |
| | Analog output | Standard 2-channel outputs AO1, AO2 (0～10V or 4～20mA optional) |
| | Relay output | Standard 2-channel relay outputs |
| Communication interface | RS485 communication | RS485 communication interface for external RS485 communication,<br>Modbus protocol (RTU mode) |
| Fault protection | ACC overcurrent, DEC overcurrent, constant speed overcurrent, ACC overvoltage, DEC overvoltage, constant speed overvoltage, bus under voltage, motor overload, inverter overload, input power failure, output phase loss, rectifier module overheating, inverter module overheating, external fault, communication fault, current detection fault, etc. | |
| Keypad display | LED display | Highlight LED digital tube displays the inverter information |
| Others | Running environment | Indoors, less than 1km above sea level, without dust, corrosive gases or direct sunlight |
| | Ambient temperature | -10～+40℃, derate 1% for every additional 1℃ when the ambient temperature is between 40～50℃ |
| | Humidity | 5～95% (no condensation) |
| | Altitude | 0～2000m, derate 1% for every additional 100m when the sea level is above 1000m |
| | Vibration | Less than 0.5g |
| | Storage temperature | −40～+70℃ |

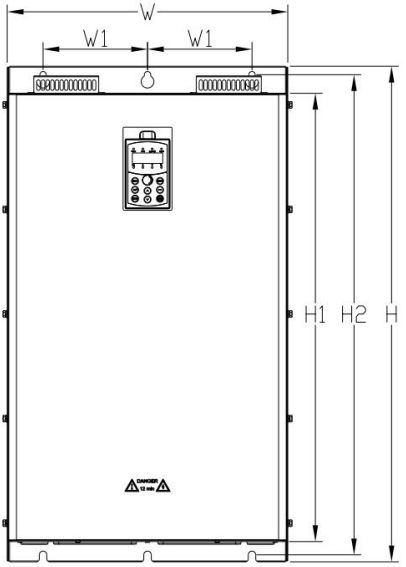
# 2.3 Structure diagram of the inverter

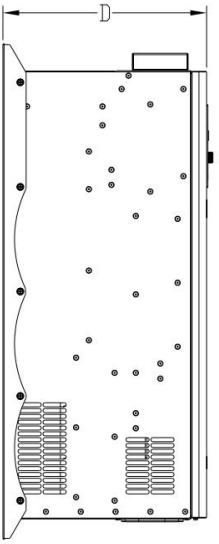



a) CT100-2S-2.2G and below power, CT100-4T-11G/15P and below power

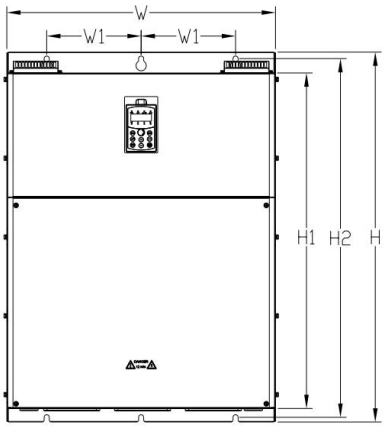


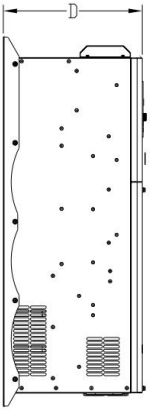

b) CT100-4T-15G/18.5P～CT100-4T-110G/132P



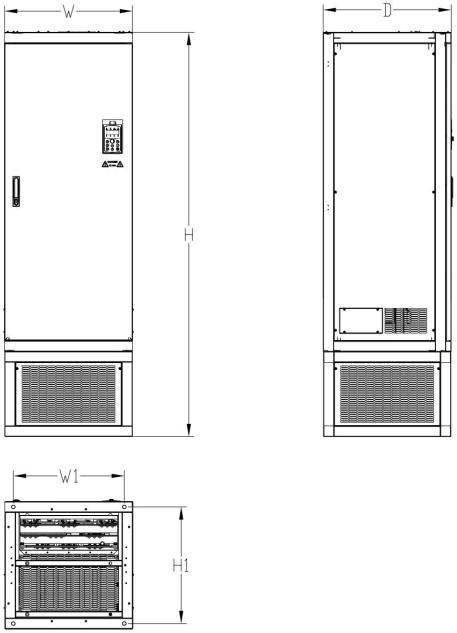




c) CT100-4T-132G/160P～CT100-4T-200G/220P




d) CT100-4T-220G/250P～CT100-4T-315G/355P




e) CT100-4T-355G～CT100-4T-500G

Figure 2-4 Structure diagram of the inverter

Table 2-3 Structure, mounting dimension and weight

| Inverter model | Structure and mounting dimension (mm) | | | | | | Mounting hole size (mm) | Weight (kg) | Cabinet |
|---|---|---|---|---|---|---|---|---|---|
| | W | H | D | W1 | H1 | H2 | | | |
| CT100-2S-0.7G-B | 126 | 186 | 155 | 115 | 175 | --- | 5 | 1.6 | C0 |
| CT100-2S-1.5G-B | | | | | | | | | |
| CT100-2S-2.2G-B | | | | | | | | | |
| CT100-4T-0.7G-B | | | | | | | | | |
| CT100-4T-1.5G-B | | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CT100-4T-2.2G-B | | | | | | | | | |
| CT100-4T-4.0G/5.5P-B | 140 | 230 | 172 | 128 | 218 | --- | 5.5 | 3.5 | C1 |
| CT100-4T-5.5G/7.5P-B | | | | | | | | | |
| CT100-4T-7.5G/11P-B | 165 | 285 | 200 | 153 | 273 | --- | 5.5 | 5.2 | C2 |
| CT100-4T-11G/15P-B | | | | | | | | | |
| CT100-4T-15G/18.5P-B | 214 | 410 | 203 | 184 | 360 | 385 | 7 | 11.5 | C3 |
| CT100-4T-18.5G/22P-B | | | | | | | | | |
| CT100-4T-22G/30P-B | | | | | | | | | |
| CT100-4T-30G/37P-B | 250 | 450 | 230 | 220 | 400 | 425 | 7 | 19 | C4 |
| CT100-4T-37G/45P-B | | | | | | | | | |
| CT100-4T-45G/55P | 300 | 600 | 280 | 240 | 540 | 580 | 9 | 30 | C5 |
| CT100-4T-55G/75P | | | | | | | | | |
| CT100-4T-75G/90P | 330 | 660 | 330 | 250 | 600 | 640 | 9 | 56 | C6 |
| CT100-4T-90G/110P | | | | | | | | | |
| CT100-4T-110G/132P | | | | | | | | | |
| CT100-4T-132G/160P | 485 | 850 | 355 | 180 | 772 | 826 | 11 | 110 | C7 |
| CT100-4T-160G/185P | | | | | | | | | |
| CT100-4T-185G/200P | | | | | | | | | |
| CT100-4T-200G/220P | | | | | | | | | |
| CT100-4T-220G/250P | 680 | 940 | 355 | 240 | 850 | 900 | 13 | 165 | C8 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CT100-4T-250G/280P | | | | | | | | | |
| CT100-4T-280G/315P | | | | | | | | | |
| CT100-4T-315G/355P | | | | | | | | | |
| CT100-4T-355G | 600 | 1900 | 600 | 520 | 548 | --- | 14 | 200 | C9 |
| CT100-4T-400G | | | | | | | | | |
| CT100-4T-500G | | | | | | | | | |
| CT100-6T-22 | 300 | 600 | 280 | 240 | 540 | 580 | 9 | 30 | C5 |
| CT100-6T-30 | | | | | | | | | |
| CT100-6T-37 | | | | | | | | | |
| CT100-6T-45 | | | | | | | | | |
| CT100-6T-55 | 330 | 660 | 330 | 250 | 600 | 640 | 9 | 56 | C6 |
| CT100-6T-75 | | | | | | | | | |
| CT100-6T-90 | | | | | | | | | |
| CT100-6T-110 | | | | | | | | | |
| CT100-6T-132 | | | | | | | | | |
| CT100-6T-160 | 485 | 850 | 355 | 180 | 772 | 826 | 11 | 110 | C7 |
| CT100-6T-185 | | | | | | | | | |
| CT100-6T-200 | | | | | | | | | |
| CT100-6T-220 | | | | | | | | | |
| CT100-6T-250 | 680 | 940 | 355 | 240 | 850 | 900 | 13 | 165 | C8 |
| CT100-6T-280 | | | | | | | | | |
| CT100-6T-315 | | | | | | | | | |
| CT100-6T-355 | | | | | | | | | |
| CT100-6T-400 | 600 | 1900 | 600 | 520 | 548 | --- | 14 | 200 | C9 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CT100-6T-500 | | | | | | | | | |
| CT100-6T-560 | | | | | | | | | |
| CT100-6T-630 | | | | | | | | | |

## 2.4 Structure diagram of the keypad (unit: mm)

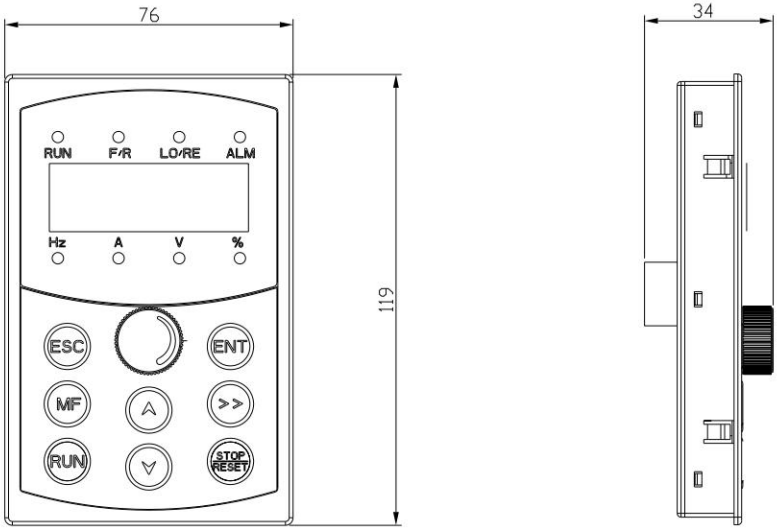



Figure 2-5 Structure diagram of the keypad

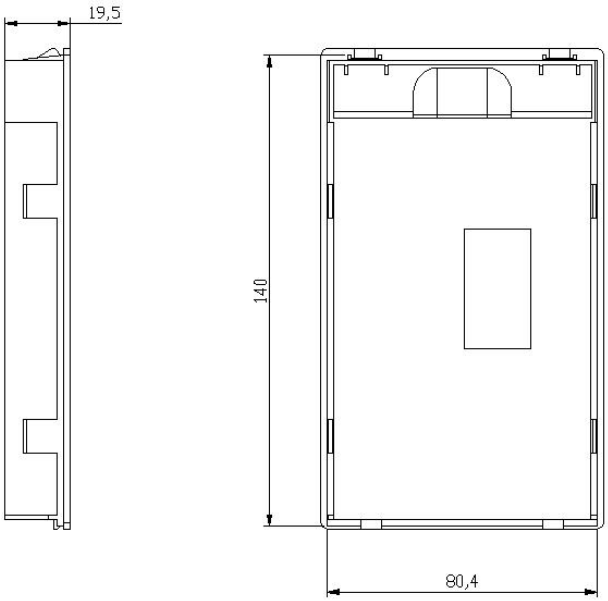



Figure 2-6 Structure diagram of the outer bracket

# 3 Installation and wiring

## 3.1 Installation environment

1. Ambient temperature: -10℃～+40℃, derate to use if the temperature is above 40℃

2. Relative humidity: ≤ 95%, no condensation

3. Vibration: ＜0.5g

4. The inverter should be installed on the flame-retardant materials and there is enough space for cooling.

5. The inverter can output the rated power if the sea level is below 1000m. If the sea level is above 1000m, the output power will decrease. It is recommended to derate 1% for every additional 100m.

6. The inverter is not allowed to fall to the ground suddenly.

7. The inverter is not allowed to be installed near the electromagnetic radiation sources.

8. The inverter is not allowed to be installed in the atmospheres with flammable, explosive or corrosive gases.

9. The inverter is not allowed to be installed in the environments with direct sunlight, oil mist or steam.

10. Take measures to avoid screws, cables and other conductive matters fall into the inverter during installation, or it may cause the inverter failure.

11. For the bad installation environments (textile industry), it is recommended to apply the mounting manner of the external cooling cabinets.

## 3.2 Installation direction and separation distance

To ensure good heat dissipation, please install it vertically, not horizontally. When multiple inverters are installed in the same cabinet, it is recommended to install the inverters horizontally. When two inverters apply the vertical mounting manner, it is necessary to add the wind board in the middle.

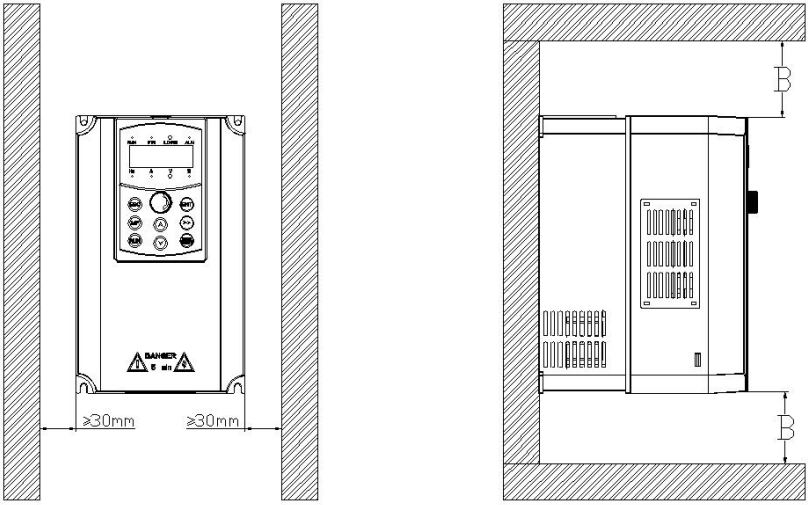



Figure 3-1 CT100-4T-11G/15P and below power

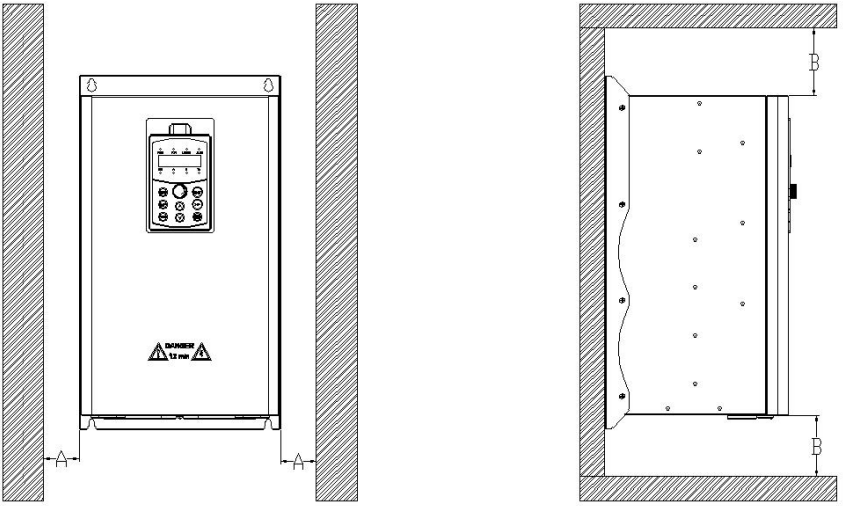



Figure 3-2 CT100-4T-15G/18.5P and above power

Table 3-1 Installation space size

| Inverter model | Installation space size (mm) | |
|---|---|---|
| | A | B |
| CT100-4T-15G/18.5P～<br>CT100-4T-37G/45P | ≧50 | ≧200 |
| CT100-4T-45G/55P～<br>CT100-4T-315G/355P | ≧50 | ≧300 |

## 3.3 Installation and disassembly of the keypad and the cover plate

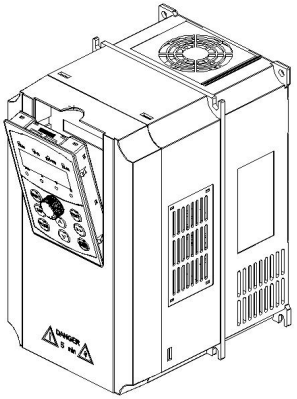


Figure 3-3 Keypad installation and disassembly of CT100-4T-11G/15P and below power

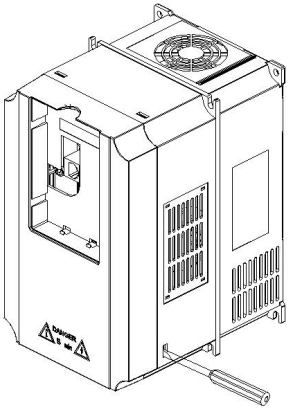


Figure (a) Disassembly position

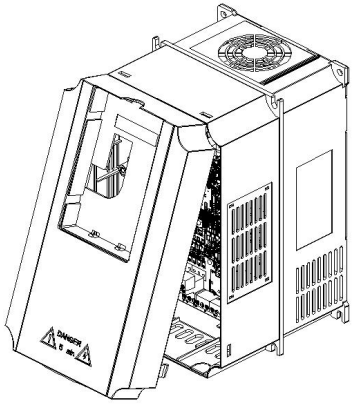


Figure (b) Disassembly direction

Figure 3-4 Cover plate installation and disassembly of CT100-4T-11G/15P and below power

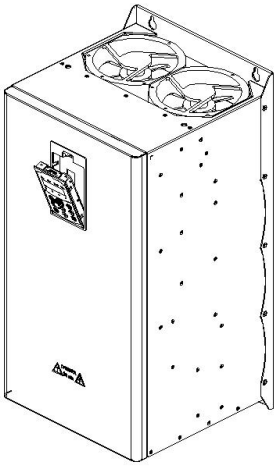


Figure 3-5 Keypad installation and disassembly of CT100-4T-15G/18.5P and above power

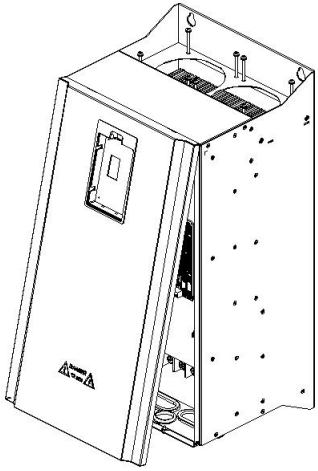


Figure 3-6 Cover plate installation and disassembly of CT100-4T-15G/18.5P and above power

# 3.4Peripheral components and instructions

## 3.4.1 Standard peripheral components

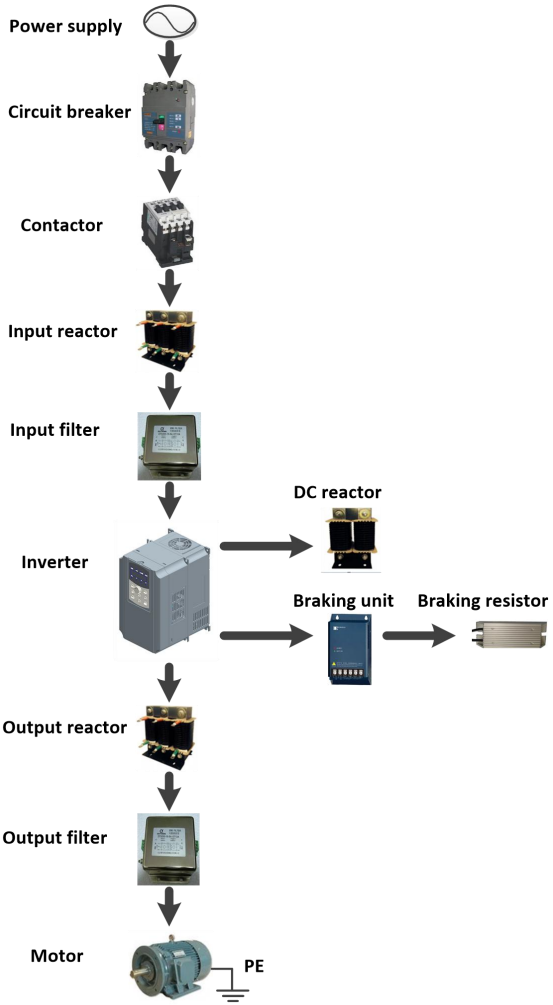



Figure 3-7 Standard peripheral components

### 3.4.2 Functions of peripheral components

Table 3-2 Functions of peripheral components

| Name | Functions |
|---|---|
| Circuit breaker | Cut off the power and protect the latter when the latter devices have failure.<br>Select the circuit breaker of the breaking current by 2 times of the inverter. |
| Leakage protector | PWM high frequency chopper voltage output causes high frequency leakage current, so select a special leakage protector. |
| Contactor | Frequent switching on-off the contactor causes inverter failure, so do not start or stop the inverter by switching on-off the main circuit, which will affect the life of the inverter. |
| Input reactor and DC reactor | Improve the power factor;<br>Reduce the impact on the system caused by the unbalance of input power;<br>Suppress high harmonics and reduce external conduction;<br>Suppress the influence on the rectifier bridge caused by the pulse current. |
| Input and output filters | Reduce the interference of the inverter on peripheral devices. |
| Braking unit and braking resistor | Consume motor energy feedback and brake fast during braking. |
| Output reactor | Reduce the protection of the inverter due to leakage current;<br>When the cable connecting the inverter and the motor is more than 100m, it is recommended to install the output reactor. |

### 3.4.3 Specifications of the cables, the circuit breakers and the contactors

Table 3-3 Specifications of the cables, the circuit breakers and the contactors

| Inverter model | Cables of main circuit (m2) | Circuit breakers (A) | Rated current of contactors (A) | Braking units/Braking resistors | |
|---|---|---|---|---|---|
| CT100-2S-0.7G-B | 2.5 | 16 | 10 | 300W | ≧150Ω |
| CT100-2S-1.5G-B | 4 | 20 | 16 | | |
| CT100-2S-2.2G-B | 4 | 32 | 25 | | |
| CT100-4T-0.7G-B | 2.5 | 10 | 10 | | |
| CT100-4T-1.5G-B | 2.5 | 16 | 10 | | |
| CT100-4T-2.2G-B | 2.5 | 16 | 10 | | |
| CT100-4T-4.0G/5.5P-B | 4 | 25 | 16 | 450W | ≧100Ω |
| CT100-4T-5.5G/7.5P-B | 4 | 32 | 25 | 600W | ≧75Ω |
| CT100-4T-7.5G/11P-B | 4 | 40 | 32 | | |
| CT100-4T-11G/15P-B | 4 | 63 | 40 | 1200W | ≧38Ω |
| CT100-4T-15G/18.5P-B | 6 | 63 | 40 | 1800W | ≧25Ω |
| CT100-4T-18.5G/22P-B | 6 | 100 | 65 | | |
| CT100-4T-22G/30P-B | 10 | 100 | 65 | | |
| CT100-4T-30G/37P-B | 16 | 125 | 80 | 5000W | ≧10Ω |
| CT100-4T-37G/45P-B | 16 | 160 | 80 | | |
| CT100-4T-45G/55P | 25 | 200 | 95 | The braking resistors are optional according to braking units | |
| CT100-4T-55G/75P | 35 | 200 | 125 | | |
| CT100-4T-75G/90P | 50 | 250 | 160 | | |
| CT100-4T-90G/110P | 70 | 250 | 160 | | |
| CT100-4T-110G/132P | 95 | 350 | 350 | | |

| | | | | |
|---|---|---|---|---|
| CT100-4T-132G/160P | 150 | 400 | 400 | when the inverter is equipped with external braking units. |
| CT100-4T-160G/185P | 185 | 500 | 400 | |
| CT100-4T-185G/200P | 240 | 630 | 400 | |
| CT100-4T-200G/220P | 150*2 | 630 | 630 | |
| CT100-4T-220G/250P | 150*2 | 630 | 630 | |
| CT100-4T-250G/285P | 185*2 | 800 | 630 | |
| CT100-4T-285G/315P | 150*3 | 800 | 800 | |
| CT100-4T-315G/355P | 150*3 | 800 | 800 | |
| CT100-4T-355G | 150*3 | 1280 | 960 | |
| CT100-4T-400G | 150*4 | 1380 | 1035 | |
| CT100-4T-500G | 150*4 | 1720 | 1290 | |

**Note:** When the inverter is built-in with braking units, the power and resistance of the braking resistors should be as required above the table, otherwise the damage to the inverter may occur. When the braking resistors are mounted externally, you need to purchase yourselves.

# 3.5 Terminals wiring of main circuit

## 3.5.1 Terminals of main circuit

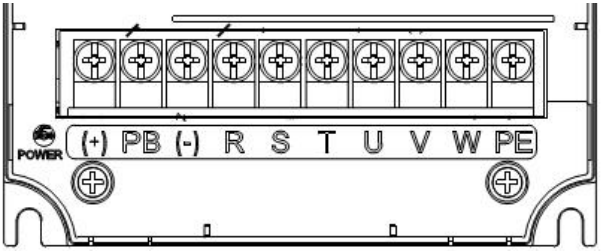



Figure 3-8 CT100-2S-2.2G, CT100-4T-11G/15P and below power

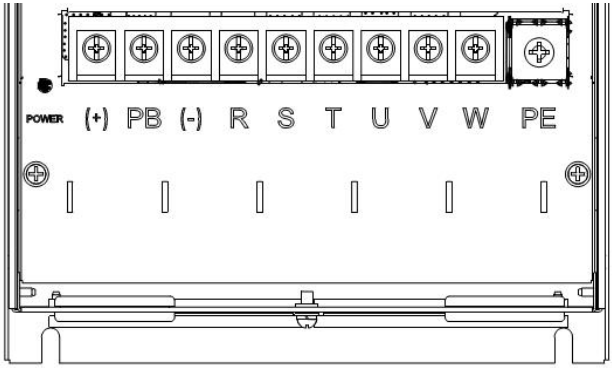



Figure 3-9 CT100-4T-15G/18.5P～CT100-4T-22G/37P

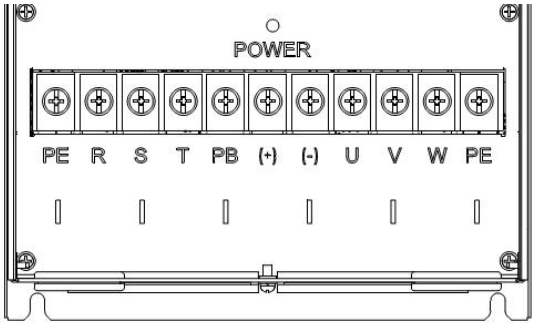



Figure 3-10 CT100-4T-30G/37P～CT100-4T-37G/45P

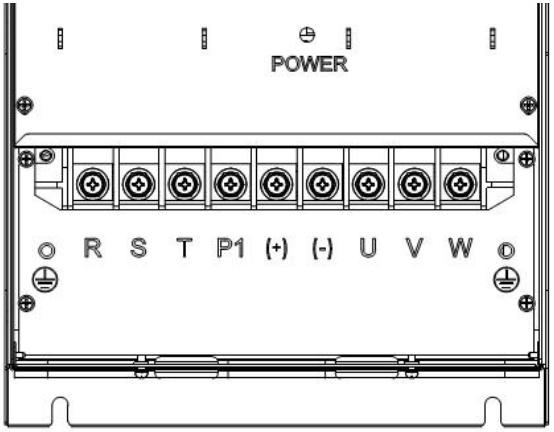



Figure 3-11 CT100-4T-45G/55P～CT100-4T-55G/75P

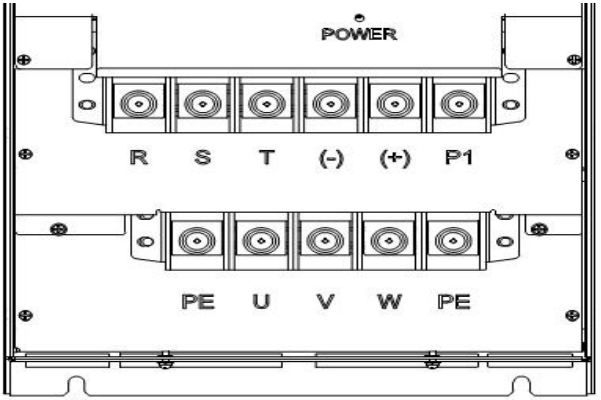



Figure 3-12 CT100-4T-75G/90P～CT100-4T-110G/132P

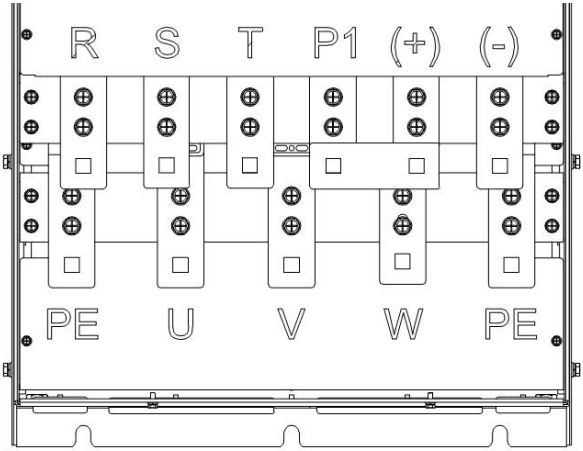



Figure 3-13 CT100-4T-132G/160P～CT100-4T-200G/220P

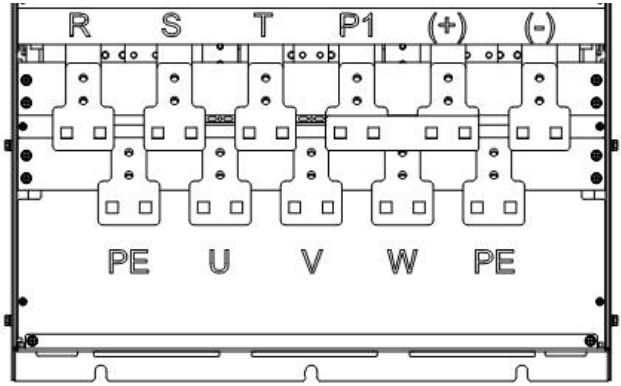



Figure 3-14 CT100-4T-220G/250P～CT100-4T-315G/355P

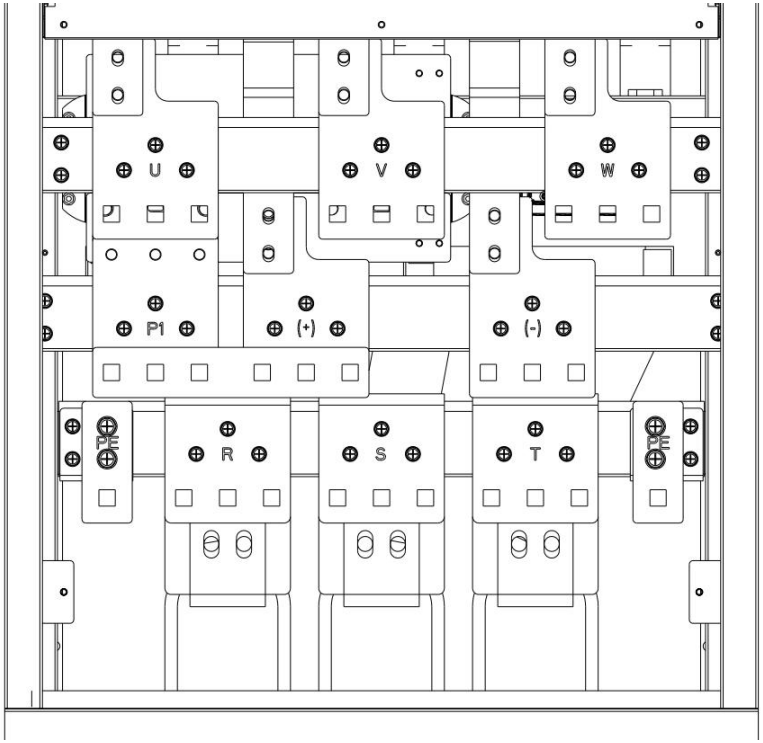



Figure 3-15 CT100-4T-355G～CT100-4T-500G

## 3.5.2 Functions of the main circuit terminals

Table 3-4 Functions of the main circuit terminals

| Terminals | Function |
|---|---|
| R, S, T | Three-phase power input terminals |
| (+), (-) | Reserved terminals for external braking units, common DC bus terminals |
| (+), PB | Reserved terminals for external braking resistors |
| P1, (+) | Reserved terminals for external DC reactors |
| (-) | DC negative bus output terminal |

| | |
|---|---|
| U, V, W | Three-phase AC output terminals |
| ⏚ | Grounding terminal (PE) |

# 3.6 Standard wiring diagram

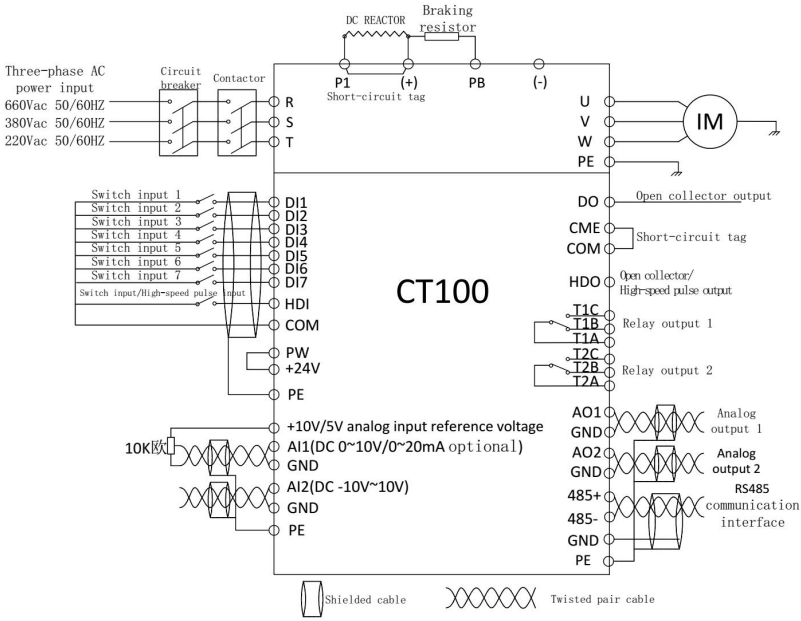



Figure 3-15 Standard wiring diagram

# 3.7 Wiring of terminals in main circuit

## 3.7.1 Power supply wiring of main circuit

1. Circuit breakers

A circuit breaker (MCCB) suitable for the inverter power is needed between the three-phase AC power supply and the power input terminals (R, S and T). The capacity of the circuit breaker is selected as 1.5～2 times of the rated current of the inverter. For details, please refer to the table of Specifications of the cables, the circuit breakers and the contactors.

2. AC contactor

To cut off the input power of the inverter effectively at system failure, the AC contactor is needed to be installed at the input side to control the switching on-off power supply of main circuit safely.

3. Input AC reactor

To prevent the high current flows into the input power circuit and damages the rectifier part when the grid inputs high voltage, the AC reactor is needed to be installed at the input side to improve the power factor at the input side.

4. Input noise filter

Applying the noise filter can reduce the interference to the peripheral devices caused by the cables when running the inverter, as shown below:

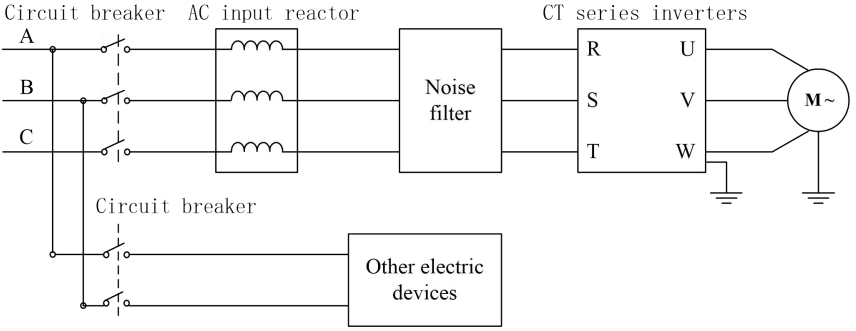



Figure 3-16 Power supply wiring of main circuit

## 3.7.2 Inverter wiring of main circuit

1. DC reactor

The CT100 inverter of 15kW～37kW is built-in DC reactor. DC reactor can improve the power factor and avoid the rectifier circuit damage caused by the sudden change of the grid voltage or the harmonics of phase control load.

2. Braking unit and braking resistor

The CT100 inverters of the 37kW (including) and below are built-in with braking units. To consume the feedback energy during braking, it is necessary to connect the braking resistor between (+) and PB.

The CT100 inverters of the 45kW and above are equipped with external braking units. To consume the feedback energy during braking, it is necessary to connect the braking unit between (+) and (-) and the braking resistor between (+) and PB.

The wiring length of the braking resistor should be less than 5m. Pay attention to

safety and good ventilation when installing the braking resistor because its temperature will rise during energy consumption.

When connecting the braking unit, do not connect (+) and (-) reversely or connect (+) and (-) with the braking resistor directly. Otherwise, damage to the inverter or a fire may occur.

## 3.7.3 Motor wiring of main circuit

1. Output reactor

When the distance between the inverter and the motor exceeds 50m, the leakage current is too large due to the parasitic capacitance effect caused by the long cable to the ground, so the inverter easily comes to frequent overcurrent protection. Meanwhile, in order to avoid the motor damage, the output reactor is needed for compensation.

2. Output noise filter

The output noise filter can reduce the radio noise due to the cable between the inverter and the motor and the leakage current of the conductor, as shown below:

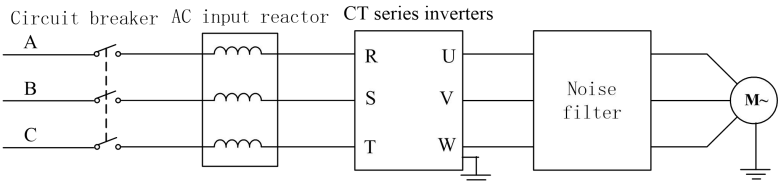



Figure 3-17 Motor wiring of main circuit

3. Feedback unit

The feedback unit can feed back the energy to the grid generated by the motor in the regenerative braking state. The feedback unit is widely used in the oil pumping unit, centrifugal machine, hoister etc.

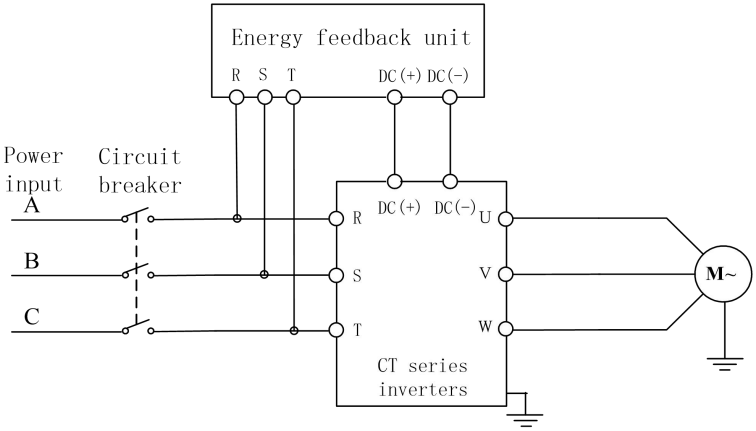



Figure 3-18 Energy feedback unit wiring of main circuit

4. Common DC bus

The common DC bus is widely applied to the multi-motor drive applications in paper machinery, textile, chemical fiber etc. At any time, some motors are in the electric state while others are in the regenerative braking (power generation) state. At this time, the regenerative energy is automatically balanced on the DC bus, which can be used for the motor in the electric state, so that the power consumption of the whole system can be reduced. Compared with the traditional way which one inverter drives one motor, the common DC bus can further save energy.

When two motors work simultaneously (such as winding and unwinding motors), one motor is in the electric state and the other motor is in the power generation state. At this time, the DC bus of the two motors can be in parallel connection and regenerative energy can be used for the motor in the electric state, so as to save energy, as shown below:

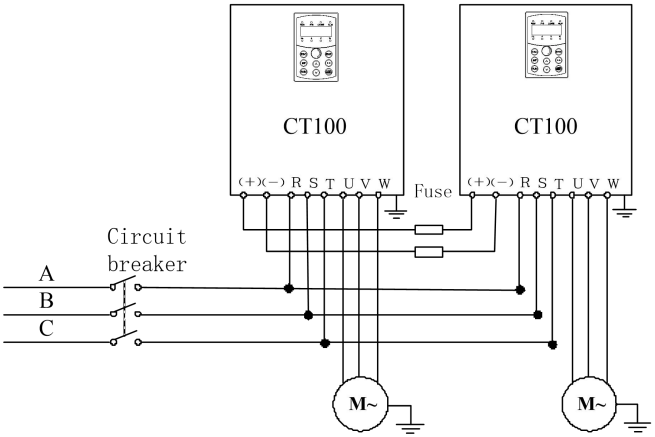



Figure 3-19 Wiring of common DC bus

Note: If connecting the DC bus directly for two inverters, make sure the models are the same and power on at the same time.

5. Grounding cable (PE)

To guarantee safety and avoid electric shock or fires, the grounding terminals (PE) of the inverter should be grounded properly. Thick and short grounding cables, more than 3.5mm2 multi-strand copper cables should be applied. When multiple inverters are grounded, it is recommended not to use a common grounding cable in case of short circuit.

# 3.8Wiring of control circuit

## 3.8.1 Precautions

Please apply the multi-core shielded cable or twisted pair to connect the control terminals. When using the shielded cable (near one side of the inverter), connect it to the PE terminal of the inverter. Keep the control cable away from the main circuit and strong power circuit (including power cables, motor cables, relays, contactors, etc.) more than 20cm. Vertical wiring is recommended instead of parallel wiring to prevent the inverter malfunction caused by external interference.

### 3.8.2 Schematic diagram of the control plate

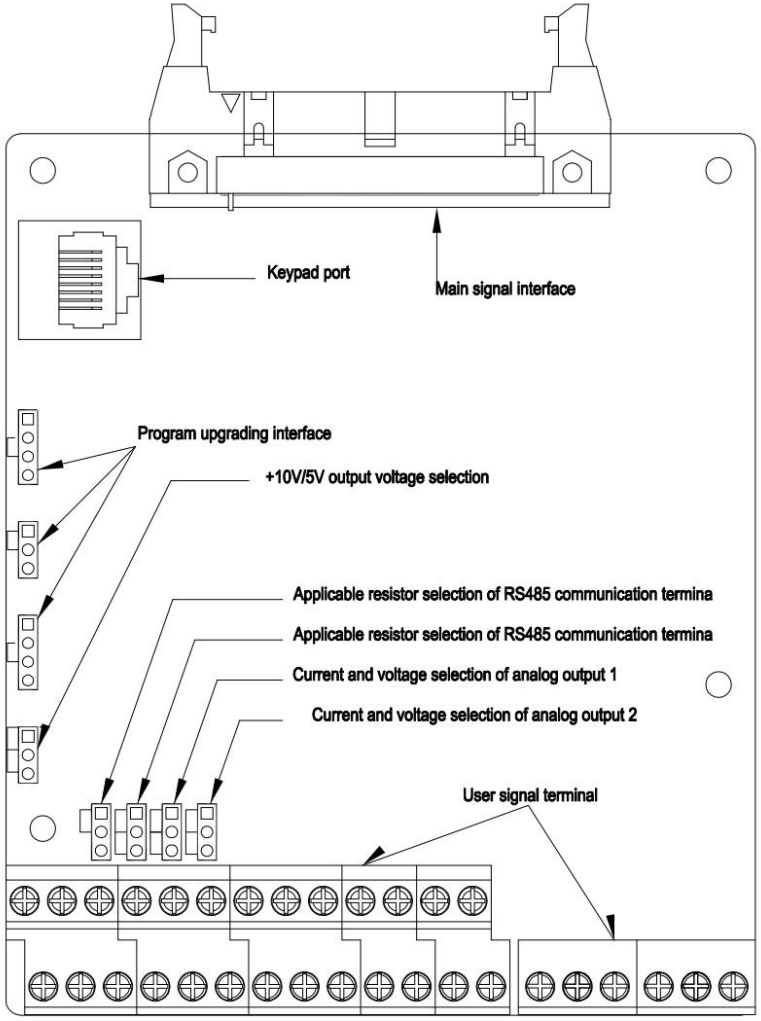
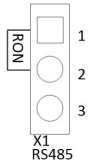
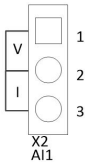
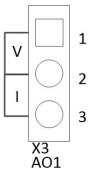
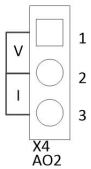



Figure 3-20 Schematic diagram of the control plate

## 3.8.3 Pins of the control plate

Table 3-5 Pin instructions of the control plate

| No. | Instructions | |
|---|---|---|
| X1 | RS485 terminating resistor setting | |
| |  | Short circuit the pins 1 and 2 of X1 by short-circuit module, the terminating resistor of 120Ωis used for RS485 bus;<br>Short circuit the pins 2 and 3 of X1 by short-circuit module, the terminating resistor is not used for RS485 bus;<br>When the short-circuit module is not used, the terminating resistor is not used for RS485 bus. |
| X2 | Analog input 1 voltage and current selection | |
| |  | Short circuit the pins 1 and 2 of X2 by short-circuit module, the analog input 1 is voltage input (0～10V);<br>Short circuit the pins 2 and 3 of X2 by short-circuit module, the analog input 1 is current input (0～20mA);<br>When the short-circuit module is not used, the analog input 1 is voltage input (0～10V). |
| X3 | Analog output 1 voltage and current selection | |
| |  | Short circuit the pins 1 and 2 of X3 by short-circuit module, the analog output 1 is voltage output (0～10V);<br>Short circuit the pins 2 and 3 of X3 by short-circuit module, the analog output 1 is current output (0～20mA). |
| X4 | Analog output 2 voltage current selection | |
| |  | Short circuit the pins 1 and 2 of X4 by short-circuit module, the analog output 2 is voltage output (0～10V);<br>Short circuit the pins 2 and 3 of X4 by short-circuit module, the analog output 2 is current output (0～20mA). |

| | | |
|---|---|---|
| X13 |  | Short circuit the pins 1 and 2 of X13 by short-circuit module, the terminal +10V/5V supplies power +10V;<br>Short circuit the pins 2 and 3 of X13 by short-circuit module, the terminal +10V/5V supplies power +5V. |
| X6 | Special pins for control board CPU downloading (factory set, unnecessary to change) | |
| X7 | | |
| X8 | | |
| X9 | The interface of the main signal for connecting the signals between the control board and the power board | |

## 3.8.4 Terminals of control circuit

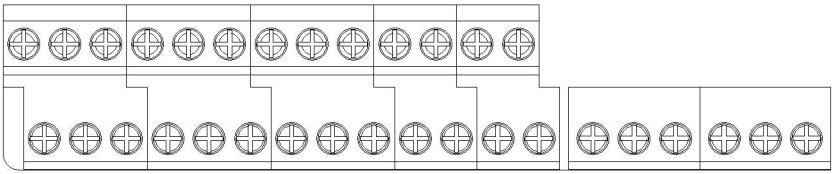


Figure 3-21 Terminals layout of control circuit

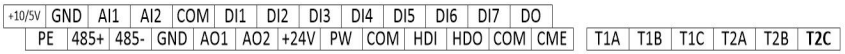



Figure 3-22 Terminals names of control circuit

## 3.8.5 Functions of terminals in control circuit

Table 3-6 Functions of terminals in control circuit

| Category | Terminal name | Terminal function | Technical specification |
|---|---|---|---|
| Switch input | +24V | +24V power supply | 24V±10%, internal isolation from GND. Max. load 200mA |
| | PW | External power input terminal (power supply of digital input terminal) | Short circuit with +24V by default |

| | | | |
|---|---|---|---|
| | DI1～DI7 | Switch input terminals 1～7 | Input specifications: 24V, 5mA |
| | HDI | High speed pulse input or switch input | Pulse input frequency range: 0～50kHz<br>High level voltage: 24V |
| | COM | +24V power supply or external power ground | Internal isolation from GND |
| Switch output | DO | Open collector output, common CME terminal | External voltage range: 0～24V |
| | CME | Common terminal of open collector output | Short circuit with COM by default |
| | HDO | High speed pulse output or open collector output, common COM terminal | Pulse output frequency range: 0～50kHz |
| | COM | HDO common terminal | Internal isolation from GND |
| Analog input | +10/5V | The local supplies +10V or 5V power output | Output voltage: 10V or 5V available via X13, optional<br>Output current range: 0～50mA<br>(If the potentiometer is connected between +10V/+5V and GND, the resistance should not be less than 2kΩ.) |
| | AI1 | Analog input terminal 1 | Input voltage and current are optional<br>Input voltage range: 0～10V<br>Input current range: 0/4～20mA |
| | AI2 | Analog input terminal 2 | Input voltage range: -10～10V |
| | GND | Analog ground | Internal isolation from COM |
| Analog output | AO1～AO2 | Analog output terminal | Output voltage and current are optional<br>Output voltage range: 0～10V<br>Output current range: 0～20mA |
| | GND | Analog ground | Internal isolation from COM |

| | | | |
|---|---|---|---|
| Relay output | T1A/T1B/T1C | Relay output | T1A-T1B: normally closed<br>T1A-T1C: normally open<br>Contact capacity: 250VAC/3A, 30VDC/1A |
| | T2A/T2B/T2C | Relay output | T2A-T2B: normally closed<br>T2A-T2C: normally open<br>Contact capacity: 250VAC/3A, 30VDC/1A |
| Communication interface | 485+/485- | RS485 communication interface | RS485 communication interface |

### 3.8.6 Wiring of switch inputs

By using the internal +24V power supply of the inverter, the wiring of the external controller for the NPN-type sink current is as shown below:

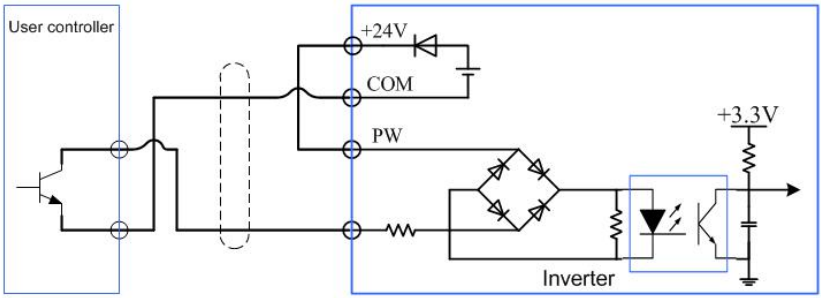



Figure 3-23 Wiring of NPN type sink current

By using the internal +24V power supply of the inverter, the wiring of the external controller for the PNP-type source current is as shown below:

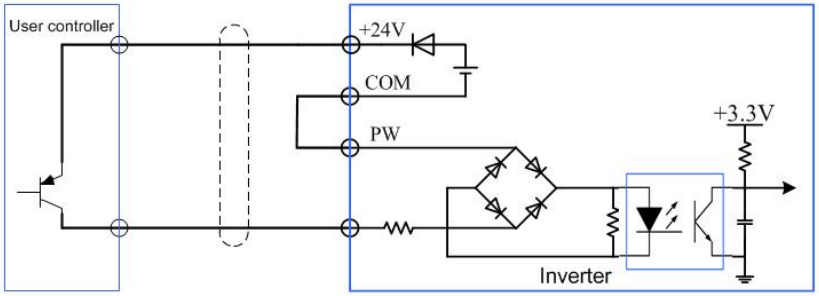



Figure 3-24 Wiring of PNP type source current

Note: Be sure to remove the short-circuit plate between +24V and PW and connect the plate between PW and COM.

By using the external power supply, the wiring of the external controller for the NPN-type sink current is as shown below:

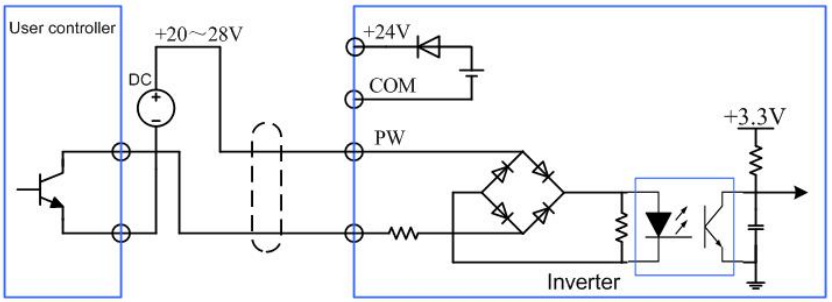



Figure 3-25 Wiring of NPN type sink current

Note: Be sure to remove the short-circuit plate between +24V and PW.

By using the external power supply, the wiring of the external controller for the PNP-type source current is as shown below:

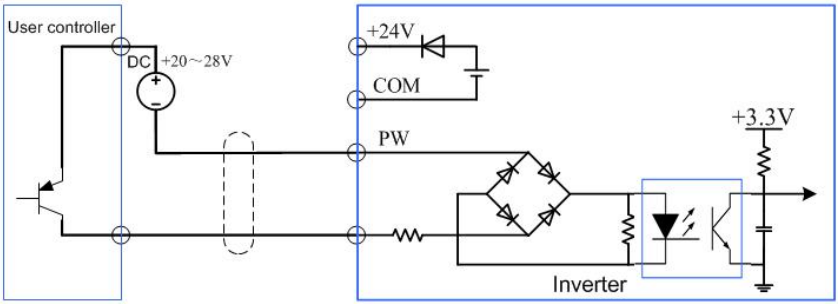



Figure 3-26 Wiring of PNP type source current

Note: Be sure to remove the short-circuit plate between +24V and PW.

# 3.9 EMC problems in wiring

## 3.9.1 General knowledge of EMC

EMC is the abbreviation of electromagnetic compatibility, which means the device or system has the ability to work normally in the electromagnetic environment and will not generate any electromagnetic interference to other equipment. EMC includes two subjects: electromagnetic interference and electromagnetic anti-jamming.

According to the transmission mode, Electromagnetic interference can be divided into two categories: conducted interference and radiated interference.

Conducted interference is the interference transmitted by conductor. Therefore, any conductors such as wire, transmission line, inductor and capacitor are the transmission channels of interference.

Radiated interference is the interference transmitted in electromagnetic waves, and the energy is inversely proportional to the square of distance.

Three necessary conditions or essentials of electromagnetic interference are: interference source, transmission channel and sensitive receiver. For customers, the solution of EMC problem is mainly in transmission channels because the device as interference source or receiver cannot be changed.

Different electric and electronic devices, because of its various EMC standards or degrees, have different EMC capacities.

The operating principle of the inverter determines that it can produce certain electromagnetic interference noise. And the same time the inverter needs to be designed with certain anti-jamming ability to ensure the smooth working in

certain electromagnetic environment.

### 3.9.2 Noise control

All the connections to the control terminals must use shielded wire. And the shield layer of the wire must ground near the wire entrance of the inverter. The ground mode is 360 degree annular connection formed by cable clips. It is strictly prohibitive to connect the twisted shielding layer to the ground of the inverter, which greatly decreases or loses the shielding effect.

Power supply wiring: The shielding layer of power supply incoming cables of the inverter shall be grounded reliably. It is strictly prohibitive to route the power cables and control cables in parallel.

Device categorization: There are different electric devices in the same distribution system, which have different ability of emitting and withstanding electromagnetic noise. Therefore, it needs to categorize these devices into strong noise device and noise sensitive device. The same kind of devices needs to be placed in the same area, and the distance between devices in different categories needs to be more than 20cm.

Wiring in the control cabinet: During wiring, signal cables and power cables need to be arranged in different areas. It is strictly prohibitive to arrange them in parallel or interlacement at a close distance (less than 20cm) or tie them together. If the signal cables have to cross the power cables, they need to be arranged in 90 degree angle.

### 3.9.3 Grounding

The inverter must be grounded safely and reliably in operation. Grounding has the priority in all EMC methods because it does not only ensure the safety of equipment and persons, but also it is the simplest, most effective and lowest-cost solution for EMC problems.

Three categories of grounding: special pole grounding, common pole grounding and series-wound grounding. Different control system needs to use special pole grounding, different devices in the same control system needs to use common pole grounding, and different devices connected by the same power cables needs to use series-wound grounding.

### 3.9.4 Leakage current

Leakage current includes cable leakage current and ground leakage current. The size depends on the distributed capacitance and the carrier frequency of the inverter in distribution.

The ground leakage current refers to the leakage current flowing through the

common ground wire, which not only flows into the inverter but also may flow into other devices via the ground wire, which may lead the leakage circuit breaker, relay or other devices to malfunction.

Cable leakage current refers to the leakage current flowing through the distributed capacitance among the output cables of the inverter. The size of the leakage current is related to the carrier frequency of the inverter, the length of the motor cable and the cross-sectional area of the cable. The higher the carrier frequency of the inverter, the longer the motor cable or the larger the cross-sectional area of the cable, the larger the leakage current.

Method to reduce the leakage current:

Reduce the carrier frequency. When the motor cable is long (50m or above), the AC reactor or sine wave filter should be installed in the output side of the inverter. When the motor line is longer, a reactor should be installed at a distance.

# 4 Keypad operation procedure

## 4.1 Keypad

The keypad consists of three parts for unit/status LEDs displaying, parameters displaying and key operation, as shown below.

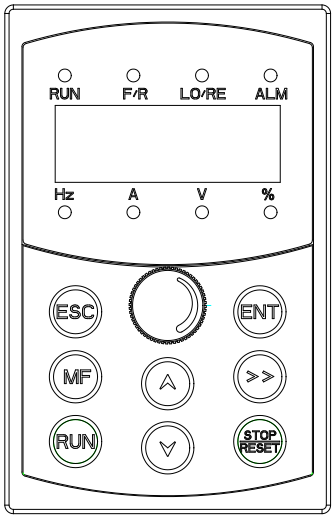



Figure 4-1 Keypad

### 4.1.1 Unit and status LEDs

Table 4-1 Unit and status LEDs

| Symbol | | Name | meaning |
|---|---|---|---|
| Unit LEDs | Hz | Frequency LED | The unit of the current displayed parameter is Hz. |
| | A | Current LED | The unit of the current displayed parameter is A. |
| | V | Voltage LED | The unit of the current displayed parameter is V. |
| | % | Percentage LED | The current displayed parameter is a percentage. |

| | | | |
|---|---|---|---|
| Status LEDs | RUN | Run status LED | On: The inverter is running.<br>Off: The inverter stopped.<br>Blinking: The inverter is in dormant state. |
| | F/R | Forward/Reverse LED | On: The inverter is in the reverse running state.<br>Off: The inverter is in the forward running state or stopped. |
| | LO/RE | Run command reference LED | Off: keypad run command reference mode<br>Blinking: terminal run command reference mode<br>On: communication run command reference mode |
| | ALM | Alarm LED | Off: no fault alarm<br>Blinking: overload pre-alarm<br>On: fault alarm |

## 4.1.2 Code displaying zone

5-figure LED display can display the monitoring data such as the set frequency and the output frequency and alarm codes.

## 4.1.3 Buttons

Table 4-2 Functions of buttons

| Button | Name | Function |
|---|---|---|
|  | Programming/ Exit key | Enter or exit the 1st level menu;<br>Return to the 1st level menu from the 2nd level menu;<br>Return to the 2nd level menu from the 3rd level menu. |
|  | Multi-function key | Operate according to multi-function selection [2] |
|  | Run key | In the keypad run command reference mode, the key is used for start control of the inverter.<br>After setting the parameter self-identification, the key is |

| | | |
|---|---|---|
| | | used to start the inverter for parameter self-identification. |
|  | Enter key | After function group confirmation of the 1st level menu, enter the 2nd level menu;<br>After function group confirmation of the 2nd level menu, enter the 3rd level menu;<br>After function parameters setting confirmation of the 3rd level menu, return to the 2nd level menu;<br>In password verification state, the password input is completed. |
|  | Right-shift key | Function group edit step[1] selection in the 1st/2nd level menu;<br>Function parameters settings edit step selection in the 3rd level menu;<br>In stop parameter display status, running parameter display status and fault display state, display parameters selection;<br>Edit bit selection in password verification state. |
|  | Stop/Reset key | In keypad run command reference mode, the key is used for stop control of the inverter;<br>In other run command reference modes, the key is used for stop protection of the inverter[3];<br>At fault or stop state, the key is used as a reset key to clear the fault alarm information. |
|  | UP key | Increase function group in the 1st/2nd level menu progressively;<br>Increase function parameters settings in the 3rd level menu progressively;<br>Increase the set frequency progressively. |
|  | DOWN key | Decrease function group in the 1st/2nd level menu progressively;<br>Decrease function parameters settings in the 3rd level menu progressively;<br>Decrease the set frequency progressively. |

| | | |
|---|---|---|
|  | Potentiometer | Adjust the frequency;<br>Adjust the torque. |

Note: [1] Select the edit step to be ones, tens or hundreds via the right-shift key.

[2] See function code (F05.04) for multi-function selection.

[3] After sending a stop command, you need to run the clear command in the current run command reference mode.

# 4.2 Operation procedure

## 4.2.1 Parameter setting

The three-level menu is:

1. Group number of function code (first-level menu);

2. Tab of function code (second-level menu);

3. Set value of function code (third-level menu).

Note: 8.8.8.8.8 is displayed initially after power on and the digital reference frequency is displayed after initialization. When you need to modify the parameters, press ESC to enter the first-level menu and F00 will be displayed. Modify the function group by ⌒ or ⌣ to F00-F15, press ENT to enter the second-level menu, press ENT key again to enter the third-level menu, modify the parameters by ⌒ or ⌣, press ENT to write into the control board and press ESC to return.

In the third-level menu, if the bit of the parameter is not blinking, it is unmodifiable, the reasons may be:

1) The function code is an unmodifiable parameter, such as the actual detection parameters, fault record parameters, operating record parameters etc.

2) The function code cannot be modified in the running state.

## 4.2.2 Fault reset

After the inverter has fault, the inverter will inform the relevant fault information. You can reset the inverter via the STOP/RESET key or the fault reset terminal (F6). The inverter will be in standby mode after fault reset. If the inverter is in a fault state and you do not reset it, the inverter cannot run and remains in the running protection state.

## 4.2.3 Motor parameter self-identification

To obtain good control performance, the motor must be self-identification of the parameters to obtain the exact parameters of the controlled motor; you must input correct motor parameters according to the name plate before identification, CT series inverters will match the parameters with the standard motor parameters.

The operation procedures for motor parameters identification are as follows:

First, select the keypad run command mode for the run command (F00.01).

Then enter the following parameters according to the actual motor parameters:

F01.02: Rated motor power;

F01.03: Rated motor frequency;

F01.04: Rated motor speed;

F01.05: Rated motor voltage;

F01.06: Rated motor current.

Note: The motor should be decoupled from the load. Otherwise, the identification parameters may be incorrect. Set F01.12 to 1, if the motor is not decoupled from the load, set F01.12 to 2 (see description of Function code F01.12 for detailed motor identification) and then press the RUN key, the inverter will automatically calculate the following parameters of the motor:

F01.07: Motor stator resistance;

F01.08: Motor rotor resistance;

F01.09: Motor stator and rotor inductance;

F01.10: Motor stator and rotor mutual inductance;

F01.11: Motor no-load current;

After the motor parameter identification is completed, the digital tube displays END, otherwise the self-identification failed.

## 4.2.4 Password setting

CT series inverters provide user password protection function. When F05.03 is set to non-zero, which is the user password. Exit the editing status of function code and password protection will take effect in 60s. Press the ESC key again to enter the editing status of function code and "8.8.8.8.8" will be displayed. You need to input correct user password, or cannot enter.

To disable the password protection function, set F05.03 to 0.

# 4.3 Display the parameters

## 4.3.1 Running state

In the running state, the inverter has a total of 19 state parameters to be selected whether to display, including the running frequency, set frequency, bus voltage, output current, output voltage, running speed, linear speed, output power, output torque, input and output terminal status, PID reference, PID feedback, high speed pulse HDI frequency, count value, PLC and multi-step speed, torque setting, potentiometer value, AI1, AI2, motor overload percentage, inverter overload percentage etc. The parameters can be selected by F05.08 and F05.09 in binary bit. Press the 》 key to switch to the right to display the selected parameters, press the MF key to switch the left to display the selected parameters.

## 4.3.2 Standby state

In the stop, fault and running state, a variety of status parameters can be displayed. The parameter can be selected by F05.10 in binary bit.

In the stop state, the inverter has a total of 10 state parameters to be selected whether to display, including the set frequency, bus voltage, input and output terminal status, potentiometer value, AI1 , AI2, high speed pulse HDI frequency, PID reference, PID feedback, PLC or multi-step speed etc. The parameters can be selected by F05.10 in binary bit. Press the 》 key to switch the selected parameters in the right and press the MF key to switch the selected parameter in the left.

## 4.3.3 Fault state

In the fault state, both the fault state and the stop state will be displayed. Press the 》 key to switch to the right to display the selected parameters, press the MF key to switch the left to display the selected parameters.

CT series inverters provide a variety of fault information. Please refer to Fault Tracking.

# 4.4 Displayed words of code displaying zone

Table 4-3 Displayed words

| Displayed word | Meaning | Displayed word | Meaning | Displayed word | Meaning | Displayed word | Meaning |
|---|---|---|---|---|---|---|---|
|  | 0 |  | 1 |  | 2 |  | 3 |
|  | 4 |  | 5 |  | 6 |  | 7 |
|  | 8 |  | 9 |  | A |  | b |
|  | C |  | d |  | E |  | F |
|  | H |  | I |  | L |  | N |
|  | o |  | P |  | S |  | T |
|  | U |  | V |  | . | | |

## 4.5 Power on at the first time

Please carry out wiring in accordance with the technical requirements in Chapter 3. The flow chart for power on at the first time is as follows:

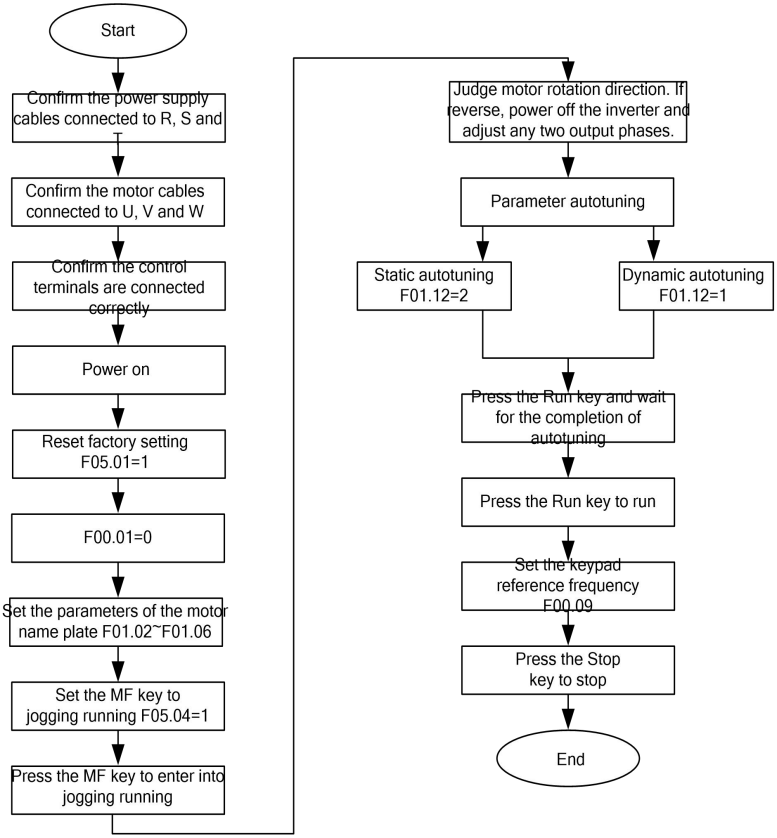



Figure 4-2 First power flow chart

# 5 Function parameters

CT100 series inverters have 16 groups of function codes F00～F14 and factory group F15. The function codes have been divided into three levels. For example, “F08.08” means the eighth function code in the P8 function group. F15 group is factory group, and users are forbidden to access these parameters.

For the convenience of function codes setting, the function group number corresponds to the first level menu, the function code corresponds to the second level menu and the function code parameter corresponds to the third level menu.

1. Below are the instructions of the tables for function codes:

The first line “Function code”: codes of function parameter group and parameters

The second line “Name”: full name of function parameters

The third line “Detailed instruction of parameters”: Detailed illustration of the function parameters

The forth line “Default value”: the original factory set value of the function parameters

The fifth line “Modify”: the modifying character of function codes (the parameters can be modified or not and the modifying conditions), below are the instructions:

“○”: means the set value of the parameter can be modified in stop and running state；

“☆”: means the set value of the parameter cannot be modified in running state；

“●”: means the value of the parameter is the real detection value which cannot be modified.

(The inverter has limited the automatic inspection of the modifying character of the parameters to help users avoid modifying by mistake)

The sixth line “No.”: the serial number of the function parameters

2. “Parameter radix” is decimal (DEC), if the parameter is expressed by hex, then the parameter is separated from each other when editing. The setting range of certain bits are hex (0～F).

3. “Default value” means the function parameter will restore to the default value during default parameters restoring. But the detected parameter or recorded value will not be restored.

4. For a better parameter protection, the inverter provides password protection to the parameters and only factory and administrator can modify the function codes. After setting the user password (F05.03 is non-zero) and press the ESC key to enter into the parameter editing state, the system goes into user password

verification and displays “0. 0. 0. 0. 0.”. You can enter only by inputting the correct user password. For the factory setting parameter zone, only factory can enter. (Remind that the users cannot modify the factory parameters by themselves; otherwise, if the parameter setting is incorrect, damage to the system may occur). If the password protection is unlocked, the user can modify the password freely and the user password will be subject to the last one. When F05.03=0, the user password is disabled.

5. When modifying the function parameters through 485 communication, the function of user password follows the above rules.

List of function parameters

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F00 Group Basic function | | | | | | |
| F00.00 | Motor control mode | 0: V/F control<br>1: speed sensorless vector control<br>2: torque control (open loop vector control) | 1 | 0 | ☆ | |
| F00.01 | Run command channel | 0: keypad run command channel (LED off)<br>1: terminal running command channel (LED flickering)<br>2: 485 run command channel (LED on) | 1 | 0 | ☆ | |
| F00.02 | Main frequency source X | 0: keypad digit (F00.09)<br>1: keypad potentiometer AI0<br>2: analog input AI1<br>3: analog input AI2<br>4: HDI pulse input<br>5: process PID output<br>6: multi-step speed<br>7: simple PLC<br>8: 485 communication | 1 | 0 | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F00.03 | Auxiliary frequency source Y | 0: keypad potentiometer AI0<br>1: analog input AI1<br>2: analog input AI2<br>3: HDI pulse input<br>4: process PID output<br>5: multi-step speed<br>6: 485 communication | 1 | 0 | ○ | |
| F00.04 | Reference object of Y frequency source | 0: relative to the max. frequency<br>1: relative to frequency source X | 1 | 1 | ○ | |
| F00.05 | Frequency combination reference operation | 0: X<br>1: Y<br>2: X+Y<br>3: Max (X, Y) | 1 | 0 | ○ | |
| F00.06 | Max. frequency | F00.07～600.00Hz | 0.01Hz | 50.00Hz | ☆ | |
| F00.07 | Upper limit frequency | F00.08～F00.06 (Max. frequency) | 0.01Hz | 50.00Hz | ○ | |
| F00.08 | Lower limit frequency | 0.00Hz～F00.07 (upper limit of running frequency) | 0.01Hz | 0.00Hz | ○ | |
| F00.09 | Keypad frequency setting | 0.00Hz～F00.06 (Max. frequency) | 0.01Hz | 50.00Hz | ○ | |
| F00.10 | Run direction | 0: positive<br>1: reverse<br>2: prohibit reverse | 1 | 0 | ☆ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F00.11 | Carrier frequency | 1.0～15.0kHz | 0.1kHz | Depend on model | ○ | |
| F00.12 | PWM optimization | 0: PWM optimization 1<br>1: PWM optimization 2<br>2: PWM optimization 3 | 1 | 0 | ☆ | |
| F00.13 | AVR function | 0: invalid<br>1: valid | 1 | 1 | ○ | |
| F00.14 | ACC time 0 | 0.1～3000.0s | 0.1s | Depend on model | ○ | |
| F00.15 | DEC time 0 | 0.1～3000.0s | 0.1s | Depend on model | ○ | |
| F01 Group Motor parameters | | | | | | |
| F01.00 | Inverter type | 0: G type<br>1: P type<br>Note: If you want to modify the parameters, the motor power and other parameters should also be manually modified as needed. | 1 | Depend on model | ☆ | |
| F01.01 | Motor type | 0: asynchronous motor<br>1: reserved | 1 | 0 | | |
| F01.02 | Rated power of asynchronous motor | 0.4～3000.0kW | 0.1KW | Depend on model | ☆ | |
| F01.03 | Rated frequency of asynchronous motor | 10.00Hz～F00.06 (Max. frequency) | 0.01Hz | 50.00Hz | ☆ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F01.04 | Rated speed of asynchronous motor | 0～36000RPM | 1RPM | Depend on model | ☆ | |
| F01.05 | Rated voltage of asynchronous motor | 0～500V | 1V | Depend on model | ☆ | |
| F01.06 | Rated current of asynchronous motor | 0.8～6000.0A | 0.1A | Depend on model | ☆ | |
| F01.07 | Stator resistance of asynchronous motor | 0.001～65.535Ω | 0.001Ω | Depend on model | ○ | |
| F01.08 | Rotor resistance of asynchronous motor | 0.001～65.535Ω | 0.001Ω | Depend on model | ○ | |
| F01.09 | Inductance of asynchronous motor | 0.1～6553.5mH | 0.1mH | Depend on model | ○ | |
| F01.10 | Mutual inductance of asynchronous motor | 0.1～6553.5mH | 0.1mH | Depend on model | ○ | |
| F01.11 | Non-load current of asynchronous motor | 0.1～6553.5A | 0.1A | Depend on model | ○ | |
| F01.12 | Motor parameters autotuning | 0: no actuation<br>1: dynamic autotuning<br>2: static autotuning | | 0 | ☆ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F02 Group Start and stop control | | | | | | |
| F02.00 | Start mode | 0: start at the starting frequency<br>1: start after DC braking<br>2: start after rotating speed tracking | 1 | 0 | ☆ | |
| F02.01 | Start delay time (reserved) | 0.0～80.0s | 0.1s | 0.0s | ○ | |
| F02.02 | Starting frequency | 0.00～20.00Hz | 0.01Hz | 1.50Hz | ☆ | |
| F02.03 | Hold time of starting frequency | 0.0～60.0s | 0.1s | 0.0s | ☆ | |
| F02.04 | DC braking current before start | 0.0～160.0% | 0.1% | 0.0% | ☆ | |
| F02.05 | DC braking time before start | 0.0～60.0s | 0.1s | 0.0s | ☆ | |
| F02.06 | ACC and DEC mode | 0: linear type<br>1: S curve (reserved) | 1 | 0 | ☆ | |
| F02.07 | Terminal characteristic selection after power on | 0: run command is invalid<br>1: run command is valid | 1 | 0 | ☆ | |
| F02.08 | Restart after power off | 0: no actuation<br>1: actuation | 1 | 0 | ○ | |
| F02.09 | Waiting time for restart | 0.0～3000.0s | 0.1s | 0.0s | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F02.10 | Stop mode | 0: decelerate to stop<br>1: coast to stop | 1 | 0 | ○ | |
| F02.11 | Dead time of FWD/REV | 0.0～2000.0s | 0.1s | 0.0s | ○ | |
| F02.12 | Starting frequency before stop DC braking | 0.00～F00.06 | 0.1s | 0.00Hz | ○ | |
| F02.13 | Waiting time before stop DC braking | 0.0～60.0s | 0.1s | 0.0s | ○ | |
| F02.14 | Stop DC braking current | 0.0～160.0% | 0.1% | 0.0% | ○ | |
| F02.15 | Stop DC braking time | 0.0～60.0s | 0.1s | 0.0s | ○ | |
| F02.16 | Frequency for deceleration to stop (reserved) | F00.08～50.00Hz | 0.01Hz | 0.00Hz | ○ | |
| F02.17 | Delay time of stop frequency (reserved) | 0.0～1000.0s | 0.1s | 0.0s | ○ | |
| F02.18 | Actuation when running frequency is less than lower limit frequency | 0: run at lower limit frequency<br>1: stop<br>2: stand-by | 1 | 0 | ☆ | |
| F02.19 | Delay time of dormancy wake up | 0.0～3000.0s | 0.1s | 0 | ☆ | |
| F03 Group V/F control | | | | | | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F03.00 | V/F curve | 0: straight line V/F curve<br>1: multi-dots V/F curve<br>2: 2.0th power low torque V/F curve | 1 | 0 | ☆ | |
| F03.01 | Torque compensation | 0.0% (automatic), 0.1%～10.0% | 0.1% | 1.0% | ○ | |
| F03.02 | Torque compensation cut-off | 0.0%～50.0% (relative to motor rated frequency) | 0.1% | 20.0% | ☆ | |
| F03.03 | V/F frequency 1 | 0.00Hz～F03.05 | 0.01Hz | 0.00Hz | ○ | |
| F03.04 | V/F voltage 1 | 0.0%～100.0% (motor rated voltage) | 0.1% | 00.0% | ○ | |
| F03.05 | V/F frequency 2 | F03.03～F03.07 | 0.01Hz | 00.00Hz | ○ | |
| F03.06 | V/F voltage 2 | 0.0%～100.0% (motor rated voltage) | 0.1% | 00.0% | ○ | |
| F03.07 | V/F frequency 3 | F03.05～F01.03 (motor rated frequency) | 0.01Hz | 00.00Hz | ○ | |
| F03.08 | V/F voltage 3 | 0.0%～100.0% (motor rated voltage) | 0.1% | 0.0% | ○ | |
| F03.09 | Slip compensation gain | 0.0～200.0% | 0.1% | 0.0% | ○ | |
| F03.10 | Frequency threshold of surge suppression | 0.00Hz～F00.06 (Max. frequency) | 0.01Hz | 30.00Hz | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F03.11 | Low frequency surge suppression factor | 0.0～1.0 | 0.1 | 0.2 | ○ | |
| F03.12 | High frequency surge suppression factor | 0.0～1.0 | 0.1 | 0 | ○ | |
| F03.13 | Motor energy saving operation | 0: invalid<br>1: valid | 1 | 0 | ☆ | |
| F04 Group Vector control | | | | | | |
| F04.00 | Low speed proportional gain | 0～150 | 1 | 25 | ○ | |
| F04.01 | Low speed integral time | 0.01～15.00s | 0.01s | 0.60s | ○ | |
| F04.02 | Low speed switching frequency | 0.00Hz～F04.05 | 0.01Hz | 5.00Hz | ○ | |
| F04.03 | High speed proportional gain | 0～150 | 1 | 25 | ○ | |
| F04.04 | High speed integral time | 0.01～10.00s | 0.01s | 1.00s | ○ | |
| F04.05 | High speed switching frequency | F04.02～F00.06 (Max. frequency) | 0.01Hz | 10.00Hz | ○ | |
| F04.06 | VC slip compensation factor | 50%～200% | 1% | 100% | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F04.07 | Reserved | 50%～200% | 1% | 100% | ○ | |
| F04.08 | Speed loop filter time | 0ms～100ms | 1ms | 0ms | ○ | |
| F04.09 | Upper torque limit | 0.0～200.0% (inverter rated current) | 0.1% | G type 150.0%<br>P type 120.0% | ○ | |
| F04.10 | Torque setting | 0: keypad (F04.11)<br>1: AI1<br>2: AI2<br>3: Pulse input HDI<br>4: Multi-step torque<br>5: 485 communication (1～5: 100% corresponds to 2 times of inverter rated current) | 1 | 0 | ○ | |
| F04.11 | Keypad torque | -200.0%～200.0% (inverter rated current) | 0.1% | 50.0% | ○ | |
| F04.12 | Upper limit frequency setting | 0: keypad (F00.07)<br>1: AI1<br>2: AI2<br>3: Pulse input HDI<br>4: multi-step speed<br>5: 485 communication<br>(1～5: 100% corresponds to the Max. frequency) | 1 | 0 | ○ | |
| F04.13 | Min. excitation current (reserved) | 0.0%～50.0% | 0.1% | 10.0% | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F05 Group HMI interface | | | | | | |
| F05.00 | Chinese and English language | 0: Chinese<br>1: English (reserved) | 1 | 0 | ☆ | |
| F05.01 | Parameter initialization | 0: no actuation<br>1: restore default value<br>2: clear fault records | 1 | 0 | ☆ | |
| F05.02 | Parameter copy | 0: reserved<br>1: reserved | 1 | 0 | ☆ | |
| F05.03 | User password | 0～65535 | 1 | 0 | ○ | |
| F05.04 | Functions of MF key | 0: left-shift key to switch display state<br>1: jogging running<br>2: FWD/REV switch<br>3: clear UP/DOWN setting<br>4: non-factory parameter debugging | 1 | 0 | ○ | |
| F05.05 | Stop function of STOP/RERST key | 0: only valid for keypad control<br>1: valid for keypad and terminal control at the same time<br>2: valid for keypad and communication control at the same time<br>3: valid for all control modes | 1 | 0 | ○ | |
| F05.06 | Rotating speed display correction | 0.1～999.9% | 0.1% | 100.0% | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F05.07 | Linear speed display correction | 0.1～999.9% | 0.1% | 1.0% | ○ | |
| F05.08 | Displayed parameters 1 when running | BIT0: running frequency (Hz on)<br>BIT1: set frequency (Hz flickers)<br>BIT2: bus voltage (V on)<br>BIT3: output current (A on)<br>BIT4: output voltage (V on)<br>BIT5: rotating speed (rpm on)<br>BIT6: linear speed<br>BIT7: output power (% on)<br>BIT8: output torque (% on)<br>BIT9: input terminal status<br>BIT10: output terminal status<br>BIT11: PID reference (% on)<br>BIT12: PID feedback (% on)<br>BIT13: Pulse HDI frequency<br>BIT14: Count value<br>BIT15: PLC and current stage of multi-step speed | 0X01 | 07FF | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F05.09 | Displayed parameters 2 when running | BIT0: torque setting (% on)<br>BIT1: keypad potentiometer AI0 (V on)<br>BIT2: analog input AI1(V on)<br>BIT3: analog input AI2(V on)<br>BIT4: motor overload percentage (% on)<br>BIT5: inverter overload percentage (% on)<br>BIT6～15: reserved | 0X01 | 0 | ○ | |
| F05.10 | Displayed parameters 1 at stop | BIT0: set frequency (Hz flickers)<br>BIT1: bus voltage (V on)<br>BIT2: input terminal status<br>BIT3: output terminal status<br>BIT4: potentiometer (V on)<br>BIT5: AI1 (V on)<br>BIT6: AI2 (V on)<br>BIT7: Pulse HDI frequency (Hz on)<br>BIT8: PID reference (% on)<br>BIT9: PID feedback (% on)<br>BIT10: PLC and current stage of multi-step speed<br>BIT11: torque setting (% on)<br>BIT12～BIT15: reserved | 0X01 | 00FF | ○ | |
| F05.11 | Inverter rated power | 0.4～3000.0kW | 0.1KW | Depend on model | ● | |
| F05.12 | Inverter rated current | 0.0～6000.0A | 0.1A | Depend on model | ● | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F05.13 | Converting module temperature | -20.0～100.0℃ | 0.1℃ | | ● | |
| F05.14 | Rectification bridge temperature | -20.0～100.0℃ | 0.1℃ | | ● | |
| F05.15 | Software version | 0.00～655.35 | 0.01 | | ● | |
| F05.16 | Accumulative running time | 0～65535h | 1h | | ● | |
| F06 Group Input terminals | | | | | | |
| F06.00 | HDI input mode | 0: pulse input<br>1: switch input | 1 | 0 | ☆ | |
| F06.01 | Functions of DI1 terminal | 0: invalid<br>1: forward running<br>2: reverse running<br>3: forward jogging<br>4: reverse jogging<br>5: three-wire running<br>6: coast to stop<br>7: fault reset<br>8: emergency stop<br>9: external fault input<br>10: run pause<br>11: terminal UP | 1 | 1 | ☆ | |
| F06.02 | Functions of DI2 terminal | | 1 | 4 | ☆ | |
| F06.03 | Functions of DI3 terminal | | 1 | 7 | ☆ | |
| F06.04 | Functions of DI4 terminal | | 1 | 0 | ☆ | |
| F06.05 | Functions of DI5 terminal | | 1 | 0 | | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F06.06 | Functions of DI6 terminal | 12: terminal DOWN<br>13: UP/DOWN setting clear<br>14: UP/DOWN setting cleared temporarily | 1 | 0 | | |
| F06.07 | Functions of DI7 terminal | 15: multi-step speed pause<br>16: multi-step speed terminal 1 | 1 | 0 | | |
| F06.08 | Functions of HDI terminal switch input | 17: multi-step speed terminal 2<br>18: multi-step speed terminal 3<br>19: multi-step speed terminal 4<br>20: simple PLC stop reset<br>21: simple PLC pause<br>22: X setting and Y setting switching<br>23: (X+Y) setting and X setting switching<br>24: (X+Y) setting and Y setting switching<br>25: ACC/DEC time selection 1<br>26: ACC/DEC time selection 2<br>27: ACC/DEC disabled<br>28: torque control disabled<br>29: Counter triggered<br>30: PID control pause<br>31: wobble pause (at the current frequency)<br>32: wobble reset (return to | 1 | 0 | ☆ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| | | center frequency)<br>33: counter reset<br>34～39: reserved | | | | |
| F06.09 | DI terminal filter time | 1～15 | 1 | 5 | ○ | |
| F06.10 | Terminal control running mode | 0: two-wire control mode 1<br>1: two-wire control mode 2<br>2: three-wire control mode 1<br>3: three-wire control mode 2 | 1 | 0 | ☆ | |
| F06.11 | Adjust step length of terminal UP/DOWN frequency | 0.01～50.00Hz/s | 0.01Hz/s | 0.50Hz/s | ○ | |
| F06.12 | Adjust control of keypad and terminal UP/DOWN frequency | 0: valid, hold on power off<br>1: valid, clear after power off<br>2: invalid<br>3: valid in running, clear after power off | 1 | 0 | ○ | |
| F06.13 | Keypad potentiometer AI0 lower limit | 0.00V～F06.15 | 0.01V | 0.00V | ○ | |
| F06.14 | Corresponding setting of keypad potentiometer AI0 lower limit | -100.0%～100.0% | 0.1% | 0.0% | ○ | |
| F06.15 | Keypad potentiometer AI0 upper limit | F06.13～10.00V | 0.01V | 10.00V | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F06.16 | Corresponding setting of keypad potentiometer AI0 upper limit | -100.0%～100.0% | 0.1% | 100.0% | ○ | |
| F06.17 | Keypad potentiometer AI0 filter time | 0.00s～10.00s | 0.01s | 0.10s | ○ | |
| F06.18 | AI1 lower limit | 0.00V～F06.20 | 0.01V | 0.00V | ○ | |
| F06.19 | Corresponding setting of AI1 lower limit | -100.0%～100.0% | 0.1% | 0.0% | ○ | |
| F06.20 | AI1 upper limit | F06.18～10.00V | 0.01V | 10.00V | ○ | |
| F06.21 | Corresponding setting of AI1 upper limit | -100.0%～100.0% | 0.1% | 100.0% | ○ | |
| F06.22 | AI1 input filter time | 0.00s～10.00s | 0.01s | 0.10s | ○ | |
| F06.23 | AI2 lower limit | -10.00V～F06.25 | 0.01V | 0.00V | ○ | |
| F06.24 | Corresponding setting of AI2 lower limit | -100.0%～100.0% | 0.1% | 0.0% | ○ | |
| F06.25 | AI2 upper limit | F06.23～10.00V | 0.01V | 10.00V | ○ | |
| F06.26 | Corresponding setting of AI2 upper limit | -100.0%～100.0% | 0.1% | 100.0% | ○ | |
| F06.27 | AI2 input filter time | 0.00s～10.00s | 0.01s | 0.10s | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F06.28 | HDI lower limit frequency | 0.00kHz～F06.30 | 0.01kHz | 0.00kHz | ○ | |
| F06.29 | Corresponding setting of HDI lower limit frequency | -100.0%～100.0% | 0.1% | 0.0% | ○ | |
| F06.30 | HDI upper limit frequency | F06.28～50.00kHz | 0.01kHz | 50.00kHz | ○ | |
| F06.31 | Corresponding setting of HDI upper limit frequency | -100.0%～100.0% | 0.1% | 100.0% | ○ | |
| F06.32 | HDI frequency input filter time | 0.00s～10.00s | 0.01s | 0.10s | ○ | |
| F07 Group Output terminals | | | | | | |
| F07.00 | HDO output mode | 0: pulse output<br>1: open collector output | 1 | 0 | ○ | |
| F07.01 | HDO open collector output | 0: no output<br>1: running<br>2: fault output<br>3: frequency level detection FDT output<br>4: forward running<br>5: reverse running<br>6: ready to run<br>7: frequency arrival<br>8: zero speed running<br>9: upper limit frequency arrival<br>10: lower limit frequency arrival<br>11: overload pre-alarm<br>12: set count value arrival | 1 | 1 | ○ | |
| F07.02 | DO collector output | | 1 | 4 | ○ | |
| F07.03 | Relay T1 output | | 1 | 5 | ○ | |
| F07.04 | Relay T2 output | | 1 | 0 | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| | | 13: specified count value arrival<br>14: simple PLC stage is completed<br>15: simple PLC cycle is completed<br>16: running time arrival<br>17～20: reserved | | | | |
| F07.05 | AO1 output | 0: running frequency<br>1: ramp reference<br>2: set frequency<br>3: rotating speed<br>4: output current<br>5: output voltage<br>6: output power<br>7: output torque<br>8: set torque<br>9: potentiometer<br>10: AI1<br>11: AI2<br>12: pulse frequency HDI | 1 | 0 | ○ | |
| F07.06 | AO2 output | | 1 | 0 | ○ | |
| F07.07 | HDO open collector high-speed pulse output | | 1 | 0 | ○ | |
| F07.08 | Corresponding setting of AO1 output lower limit | 0.0%～100.0% | 0.1% | 0.0% | ○ | |
| F07.09 | AO1 output voltage (current) lower limit | 0.00V～F07.11 | 0.01V | 0.00V | ○ | |
| F07.10 | Corresponding setting of AO1 output upper limit | 0.0%～100.0% | 0.1% | 100.0% | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F07.11 | AO1 output voltage (current) upper limit | F07.09～10.00V | 0.01V | 10.00V | ○ | |
| F07.12 | Corresponding setting of AO2 output lower limit | 0.0%～100.0% | 0.1% | 0.0% | ○ | |
| F07.13 | AO2 output voltage (current) lower limit | 0.00V～F07.15 | 0.01V | 0.00V | ○ | |
| F07.14 | Corresponding setting of AO2 output upper limit | 0.0%～100.0% | 0.1% | 100.0% | ○ | |
| F07.15 | AO2 output voltage (current) upper limit | F07.13～10.00V | 0.01V | 10.00V | ○ | |
| F07.16 | Corresponding setting of HDO output lower limit | 0.00%～100.0% | 0.1% | 0.00% | ○ | |
| F07.17 | HDO output lower limit | 0.00kHz～F07.19 | 0.01kHz | 0.00kHz | ○ | |
| F07.18 | Corresponding setting of HDO output upper limit | 0.00%～100.0% | 0.1% | 100.0% | ○ | |
| F07.19 | HDO output upper limit | F07.17～50.00kHz | 0.01kHz | 50.00kHz | ○ | |
| F08 Group Fault and protection | | | | | | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F08.00 | Motor overload protection | 0: No protection<br>1: ordinary motor (with low speed compensation)<br>2: variable frequency motor (without low speed compensation) | 1 | 2 | ☆ | |
| F08.01 | Motor overload protection factor | 20.0%～120.0% | 0.1% | 100.0% | ○ | |
| F08.02 | Motor overload warning point | 10.0～200.0% (relative to the rated current of the inverter) | 0.1% | G type 150.0%<br>P type 120.0% | ○ | |
| F08.03 | Motor overload warning detection time | 0.0～60.0s | 0.1s | 0.1s | ○ | |
| F08.04 | Overload warning actuation selection | 0: no detection<br>1: overload warning is valid in running, continue to run<br>2: overload warning is valid in running, alarm (E.oL3) and stop<br>3: overload warning is valid in constant speed running, continue to run after detection<br>4: overload warning is valid in constant speed running, alarm (E.oL3) and stop after detection | 1 | 1 | ○ | |
| F08.05 | Overvoltage stall selection | 0: disabled<br>1: enabled | 1 | 1 | ○ | |
| F08.06 | Overvoltage stall protection voltage | 110～150% | 1% | 135% | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F08.07 | Overcurrent stall protection current | 50～200% | 1% | G type 160%<br>P type 120% | ○ | |
| F08.08 | Overcurrent stall frequency decreasing ratio | 0.00～50.00Hz/s | 0.01Hz/s | 10.0Hz/s | ○ | |
| F08.09 | Overcurrent stall actuation selection | 0: always valid<br>1: invalid at constant speed | 1 | 0 | ○ | |
| F08.10 | Frequency decreasing point at sudden power loss | 70.0～110.0% (standard bus voltage) | 0.1% | 80.0% | ○ | |
| F08.11 | Frequency decreasing ratio at sudden power loss | 0.00Hz ～ F00.06 (Max. frequency) | 0.01Hz | 0.00Hz/s | ○ | |
| F08.12 | Input phase loss protection | 0: disabled<br>1: enabled | 1 | 1 | ○ | |
| F08.13 | Output phase loss protection | 0: disabled<br>1: enabled | 1 | 1 | ○ | |
| F08.14 | Automatic reset times | 0～3 | 1 | 0 | ○ | |
| F08.15 | Automatic reset interval | 0.1～100.0s | 0.1s | 1.0s | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F08.16 | Previous 2 fault type | 0: no fault<br>1: ACC overcurrent (E.oC1)<br>2: DEC overcurrent (E.oC2)<br>3: constant speed overcurrent (E.oC3)<br>4: ACC overvoltage (E.oU1)<br>5: DEC overvoltage (E.oU2)<br>6: constant speed overvoltage (E.oU3)<br>7: bus undervoltage fault (E.Lv)<br>8: inverter unit U phase protection (E.oUT1)<br>9: inverter unit V phase protection (E.oUT2)<br>10: inverter unit W phase protection (E.oUT3)<br>11: motor overload (E.oL1)<br>12: inverter overload (E.oL2)<br>13: overload pre-warning fault (E.oL3)<br>14: radiator 1 overheating (E.oH1)<br>15: radiator 2 overheating (E.oH2)<br>16: input side phase loss (E.ILF)<br>17: output side phase loss (E.oLF)<br>18: braking unit fault (E.bC)<br>19: autotuning fault (E.AUT)<br>20: PID disconnection fault (E.PIDE)<br>21: communication failure (E.485)<br>22: external fault (E.EF)<br>23: EEPROM operation failure (E.EPR)<br>24: run time arrival (E.ENd)<br>25: current detection fault | 1 | | ● | |
| F08.17 | Previous fault type | | 1 | | ● | |
| F08.18 | Current fault type | | | | | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F08.19 | Frequency at current fault | | 0.01Hz | | ● | |
| F08.20 | Current at current fault | | 0.1A | | ● | |
| F08.21 | Bus voltage at current fault | | 0.1V | | ● | |
| F08.22 | Input terminal status at current fault | | 1 | | ● | |
| F08.23 | Output terminal status at current fault | | 1 | | ● | |
| F09 Group PID function | | | | | | |
| F09.00 | PID reference channel | 0: digital reference (F09.01)<br>1: AI1<br>2: AI2<br>3: HDI<br>4: multi-step speed<br>5: 485 communication | 1 | 0 | ○ | |
| F09.01 | PID keypad reference | 0.0%～100.0% | 0.1% | 0.0% | ○ | |
| F09.02 | PID feedback channel | 0: AI1<br>1: AI2<br>2: AI1+AI2<br>3: HDI<br>4: 485 communication | 1 | 0 | ○ | |
| F09.03 | PID direction | 0: positive<br>1: negative | 1 | 0 | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F09.04 | PID output upper limit (reserved) | -100.0%～100.0% | 0.1% | 100.0% | ○ | |
| F09.05 | PID output lower limit (reserved) | -100.0%～100.0% | 0.1% | 0.0% | ○ | |
| F09.06 | Proportional gain P | 0.00～100.00 | 0.01 | 0.10 | ○ | |
| F09.07 | Integral time I | 0.01～10.00s | 0.01s | 0.10s | ○ | |
| F09.08 | Differential time D | 0.00～10.00s | 0.01s | 0.00s | ○ | |
| F09.09 | Sampling cycle T | 0.00～100.00s | 0.01s | 0.10s | ○ | |
| F09.10 | PID control deviation limit | 0.0～100.0% | 0.1% | 0.0% | ○ | |
| F09.11 | Feedback loss detection value | 0.0～100.0% | 0.1% | 0.0% | ○ | |
| F09.12 | Feedback loss detection time | 0.0～3000.0s | 0.1s | 1.0s | ○ | |
| F10 Group Wobble, step length and count value | | | | | | |
| F10.00 | Jump frequency 1 | 0.00 ～ F00.06 (Max. frequency) | 0.01Hz | 0.00Hz | ○ | |
| F10.01 | Jump frequency 2 | 0.00 ～ F00.06 (Max. frequency) | 0.01Hz | 0.00Hz | ○ | |
| F10.02 | Jump frequency amplitude | 0.00 ～ F00.06 (Max. frequency) | 0.01Hz | 0.00Hz | ○ | |
| F10.03 | Wobble amplitude | 0.0～100.0% (relative to the set frequency) | 0.1% | 0.0% | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F10.04 | Saltation frequency amplitude | 0.0 ～ 50.0% (relative to the wobble amplitude) | 0.1% | 0.0% | ○ | |
| F10.05 | Wobble rise time | 0.0～3000.0s | 0.1s | 5.0s | ○ | |
| F10.06 | Wobble down time | 0.0～3000.0s | 0.1s | 5.0s | ○ | |
| F10.07 | Set count value | F10.08～65535 | 1 | 0 | ○ | |
| F10.08 | Designated count value | 0～F10.07 | 1 | 0 | ○ | |
| F11 Group Multi-step speed and PLC | | | | | | |
| F11.00 | Multi-step speed command 0 | -100.0～100.0% | 0.1% | 0.0% | ○ | |
| F11.01 | Multi-step speed command 1 | -100.0～100.0% | 0.1% | 0.0% | ○ | |
| F11.02 | Multi-step speed command 2 | -100.0～100.0% | 0.1% | 0.0% | ○ | |
| F11.03 | Multi-step speed command 3 | -100.0～100.0% | 0.1% | 0.0% | ○ | |
| F11.04 | Multi-step speed command 4 | -100.0～100.0% | 0.1% | 0.0% | ○ | |
| F11.05 | Multi-step speed command 5 | -100.0～100.0% | 0.1% | 0.0% | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F11.06 | Multi-step speed command 6 | -100.0～100.0% | 0.1% | 0.0% | ○ | |
| F11.07 | Multi-step speed command 7 | -100.0～100.0% | 0.1% | 0.0% | ○ | |
| F11.08 | Multi-step speed command 8 | -100.0～100.0% | 0.1% | 0.0% | ○ | |
| F11.09 | Multi-step speed command 9 | -100.0～100.0% | 0.1% | 0.0% | ○ | |
| F11.10 | Multi-step speed command 10 | -100.0～100.0% | 0.1% | 0.0% | ○ | |
| F11.11 | Multi-step speed command 11 | -100.0～100.0% | 0.1% | 0.0% | ○ | |
| F11.12 | Multi-step speed command 12 | -100.0～100.0% | 0.1% | 0.0% | ○ | |
| F11.13 | Multi-step speed command 13 | -100.0～100.0% | 0.1% | 0.0% | ○ | |
| F11.14 | Multi-step speed command 14 | -100.0～100.0% | 0.1% | 0.0% | ○ | |
| F11.15 | Multi-step speed command 15 | -100.0～100.0% | 0.1% | 0.0% | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F11.16 | PLC work mode | 0: stop after a single run<br>1: run at the final value after a single run<br>2: circulate to run | 1 | 0 | ○ | |
| F11.17 | PLC power failure memory | 0: disabled<br>1: enabled | 1 | 0 | ○ | |
| F11.18 | PLC restart mode | 0: rerun<br>1: continue running at the interrupted frequency | 1 | 0 | ☆ | |
| F11.19 | ACC/DEC time selection of PLC step 0～7 | 0～FFFF | 0X01 | 0 | ○ | |
| F11.20 | ACC/DEC time selection of PLC step 8～15 | 0～FFFF | 0X01 | 0 | ○ | |
| F11.21 | PLC running time unit | 0: second<br>1: minute | 1 | 0 | ☆ | |
| F11.22 | Running time of step 0 | 0.0～6553.5s(h) | 0.1s(h) | 0.0s | ○ | |
| F11.23 | Running time of step 1 | 0.0～6553.5s(h) | 0.1s(h) | 0.0s | ○ | |
| F11.24 | Running time of step 2 | 0.0～6553.5s(h) | 0.1s(h) | 0.0s | ○ | |
| F11.25 | Running time of step 3 | 0.0～6553.5s(h) | 0.1s(h) | 0.0s | ○ | |
| F11.26 | Running time of step 4 | 0.0～6553.5s(h) | 0.1s(h) | 0.0s | ○ | |
| F11.27 | Running time of step 5 | 0.0～6553.5s(h) | 0.1s(h) | 0.0s | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F11.28 | Running time of step 6 | 0.0～6553.5s(h) | 0.1s(h) | 0.0s | ○ | |
| F11.29 | Running time of step 7 | 0.0～6553.5s(h) | 0.1s(h) | 0.0s | ○ | |
| F11.30 | Running time of step 8 | 0.0～6553.5s(h) | 0.1s(h) | 0.0s | ○ | |
| F11.31 | Running time of step 9 | 0.0～6553.5s(h) | 0.1s(h) | 0.0s | ○ | |
| F11.32 | Running time of step 10 | 0.0～6553.5s(h) | 0.1s(h) | 0.0s | ○ | |
| F11.33 | Running time of step 11 | 0.0～6553.5s(h) | 0.1s(h) | 0.0s | ○ | |
| F11.34 | Running time of step 12 | 0.0～6553.5s(h) | 0.1s(h) | 0.0s | ○ | |
| F11.35 | Running time of step 13 | 0.0～6553.5s(h) | 0.1s(h) | 0.0s | ○ | |
| F11.36 | Running time of step 14 | 0.0～6553.5s(h) | 0.1s(h) | 0.0s | ○ | |
| F11.37 | Running time of step 15 | 0.0～6553.5s(h) | 0.1s(h) | 0.0s | ○ | |
| F12 Group 485 communication | | | | | | |
| F12.00 | Local address | 0 is the broadcast address, 1～247 are slave addresses | 1 | 1 | ○ | |
| F12.01 | Baud rate | 0：1200bps<br>1：2400bps<br>2：4800bps<br>3：9600bps<br>4：19200bps<br>5：38400bps | 1 | 4 | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F12.02 | Data check | 0: no check (N, 8,1) for RTU<br>1: even check (E, 8,1) for RTU<br>2: odd check (O, 8,1) for RTU<br>3: no check (N, 8,2) for RTU<br>4: even check (E, 8,2) for RTU<br>5: odd check (O, 8,2) for RTU | 1 | 1 | ○ | |
| F12.03 | Response delay | 0～200ms | 1ms | 5 | ○ | |
| F12.04 | Communication timeout detection time | 0.0 (invalid), 0.1～100.0s | 0.1s | 0.0s | ○ | |
| F12.05 | Communication timeout error handling | 0: alarm and coast to stop<br>1: no alarm and continue running<br>2: no alarm and stop according to stop mode (communication mode is valid)<br>3: no alarm and stop according to stop mode (all control modes are valid) | 1 | 1 | ○ | |
| F12.06 | Communication processing actuation selection | LED ones<br>0: write with response<br>1: write without response<br>LED tens<br>0: set value unsaved after power off<br>1: set value saved after power off | 0x01 | 0x00 | ○ | |
| F13 Group Auxiliary functions | | | | | | |
| F13.00 | Jogging frequency | 0.00 ～ F00.06 (Max. frequency) | 0.01Hz | 5.00Hz | ○ | |
| F13.01 | Jogging running ACC time | 0.1～3000.0s | 0.1s | 20.0S | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F13.02 | Jogging running DEC time | 0.1～3000.0s | 0.1s | 20.0S | ○ | |
| F13.03 | ACC time 1 | 0.1～3000.0s | 0.1s | 20.0S | ○ | |
| F13.04 | DEC time 1 | 0.1～3000.0s | 0.1s | 20.0S | ○ | |
| F13.05 | ACC time 2 | 0.1～3000.0s | 0.1s | 20.0S | ○ | |
| F13.06 | DEC time 2 | 0.1～3000.0s | 0.1s | 20.0S | ○ | |
| F13.07 | ACC time 3 | 0.1～3000.0s | 0.1s | 20.0S | ○ | |
| F13.08 | DEC time 3 | 0.1～3000.0s | 0.1s | 20.0S | ○ | |
| F13.09 | Emergency stop DEC time (reserved) | 0.1～3000.0s | 0.1s | 1.0s | ○ | |
| F13.10 | FDT level detection value | 0.00～F00.06 (Max. frequency) | 0.01Hz | 50.00Hz | ○ | |
| F13.11 | FDT lag detection | 0.0～100.0% (FDT level) | 0.1% | 5.0% | ○ | |
| F13.12 | Frequency arrival detection amplitude | 0.0 ～ 100.0% (Max. frequency) | 0.1% | 0.0% | ○ | |
| F13.13 | Droop control | 0.00～10.00Hz | 0.01Hz | 0.00Hz | ○ | |
| F13.14 | Braking threshold voltage | 115.0～140.0% (standard bus voltage) (380V) | 0.1% | 130.0% | ○ | |
| | | 115.0～140.0% (standard bus voltage) (220V) | 0.1% | 120.0% | | |
| F13.15 | Overmodulation function | 0: invalid<br>1: valid | 1 | 0 | ○ | |
| F13.16 | Running mode of cooling fan | 0: normal running mode<br>1: keep running after power on | 1 | 0 | ○ | |

| Function code | Name | Detailed instruction of parameters | Min. unit | Default value | Modify | No. |
|---|---|---|---|---|---|---|
| F13.17 | Set running time | 0～65535h | 1h | 65535h | ○ | |
| F14 Group Reserved functions | | | | | | |
| F14.00～F14.09 | Reserved | | | | ● | |
| F15 Group Factory parameters | | | | | | |
| F15.00 | Factory password | 0～65535 | 1 | ***** | ○ | |

# 6 Detailed instructions of function parameters

## 6.1 Basic function (F00 group)

| F00.00 | Motor control mode | Setting range: 0～2 | Default value: 0 |
|---|---|---|---|

0: V/F control

It is suitable in cases with low speed control precision and where one inverter drives multi-motors, such as fans and water pumps.

1: speed sensorless vector control

It is suitable in cases with general speed control precision, low-frequency large-torque and where one inverter drives several same motors, such as machine tools, centrifuges, electric locomotives, injection molding machines, hoisters etc.

2: torque control

It is suitable in cases with high speed control precision, fast dynamic response and torque control, such as drawing machines, printing and dyeing machinery etc.

| F00.01 | Run command channel | Setting range: 0～2 | Default value: 0 |
|---|---|---|---|

Select the control command channel for the inverter.

The control commands include: start, stop, forward running, reverse running, jogging etc.

0: keypad run command channel (LED off)

Press the RUN, STOP/RESET or MF keys on the keypad to control the inverter run, stop, forward running, reverse running or jogging.

1: terminal running command channel (LED flickering)

Define the multi-function input terminals DI1～DI7 or HDI to forward running, reverse running and jogging for inverter operation control. Refer to F06.01～F06.08.

2: 485 run command channel (LED on)

The start and stop of the inverter is controlled by the upper computer through Modbus.

| F00.02 | Main frequency source X | Setting range: 0～8 | Default value: 0 |
|---|---|---|---|

0: keypad digit

The frequency of the inverter is set by F00.09.

1: keypad potentiometer AI0

The frequency of the inverter is set by the keypad potentiometer.

2: analog input AI1

3: analog input AI2

The frequency of the inverter is set by analog input terminals. 2 analog input terminals AI1 and AI2, where AI1 supports 0～10V or 4～20mA input, select current or voltage by X2 jumper of the control board, AI2 supports -10V～10V voltage input. For selection modes, refer to the instructions of control board terminals.

4: HDI pulse input

The frequency is set by the terminal HDI pulse frequency.

Pulse reference signal specifications: voltage range 9V～30V, frequency range 0.00K～50.00kHz

5: process PID output

In this case, you need to set the PID functions of F09 group. The set frequency of the inverter is the frequency after PID operation. For PID source, reference quantity and feedback source, refer to the PID functions of F09 group.

6: multi-step speed

The frequency of the inverter is set by the multi-step setting F11.00 to F11.15 determined by the multi-step speed command terminals 1～4.

7: simple PLC

When the frequency source is a simple PLC, you need to set the function parameters of F11 group to determine the frequency.

8: 485 communication

The frequency source is set by the upper computer through 485 communication mode.

| F00.03 | Auxiliary frequency source Y | Setting range: 0～6 | Default value: 0 |
|---|---|---|---|

0: keypad potentiometer AI0

1: analog input AI1

2: analog input AI2

3: HDI pulse input

4: Process PID output

5: multi-step speed

6: 485 communication

The Y frequency source has the same meaning as the X frequency source.

| | | | |
|---|---|---|---|
| F00.04 | Reference object of Y frequency source | Setting range: 0～1 | Default value: 0 |

0: relative to the max. frequency

1: relative to frequency source X

Y frequency needs to combine F00.03 and F00.04 for calculation.

When the Y frequency reference is the maximum output frequency (F00.06), it is calculated in the same way as the X frequency.

When the reference frequency is X frequency, then calculate the X frequency at first. Then take X frequency as a reference to calculate the Y frequency. For example, when the Y frequency is set by the analog input AI1 and the analog input AI1 corresponds to 50.0%, the X frequency is 100.00Hz and finally the Y frequency is 50.0% * 100.00Hz = 50.00Hz. X frequency calculation refers to F00.02.

| | | | |
|---|---|---|---|
| F00.05 | Frequency combination reference operation | Setting range: 0～3 | Default value: 0 |

0: X

1: Y

2: X+Y

3: Max (X, Y)

The combination of the set frequency mode can combine the terminal frequency sources to switch the set frequency channels flexibly, such as switching between X frequency source and Y frequency source, switching between X frequency source and X+Y frequency source. The set frequency is invalid for torque control and is only valid for speed control.

| | | | |
|---|---|---|---|
| F00.06 | Max. frequency | Setting range: F00.08～600.00Hz | Default value: 50.00Hz |

The ACC/DEC time is calculated with the maximum frequency as a reference.

| | | | |
|---|---|---|---|
| F00.07 | Upper limit | Setting range: F00.09 ～ | Default value: |

| | | | |
|---|---|---|---|
| | frequency | F00.07 | 50.00Hz |
| F00.08 | Lower limit frequency | Setting range: 0.00Hz ～ F00.08 | Default value: 0.00Hz |

The upper and lower limit frequency is the running maximum and minimum frequency of the motor according to the requirements of production process.

| | | | |
|---|---|---|---|
| F00.09 | Keypad frequency setting | Setting range: 0.00Hz ～ F00.07 | Default value: 50.00Hz |

When the X frequency reference (F00.02) is selected as a digital reference, the function code value sets the initial value for the frequency setting of the inverter.

| | | | |
|---|---|---|---|
| F00.10 | Run direction | Setting range: 0～2 | Default value: 0 |

0: positive

After power on, the inverter runs in the actual direction.

1: reverse

Be used to change the running direction of the motor.

In some cases, the motor runs reversely. It is complicated to change the wiring of the motor. The function code can bring debugging convenience.

2: prohibit reverse

For some devices, reverse running may cause damage to the equipment, this function can be used to prohibit reverse running.

For example, when the run direction selection (F00.10) selects reverse and the reverse running of the terminal command channel is valid, the motor actually rotates forward.

| | | | |
|---|---|---|---|
| F00.11 | Carrier frequency | Setting range: 1.0 ～ 15.0kHz | Default value: Depend on model |

This function adjusts the carrier frequency of the inverter. Adjusting the carrier frequency can reduce the motor noise, avoid the resonance point of the mechanical system, and reduce the line-to-ground leakage current and the interference caused by the inverter.

When the carrier frequency is low, the high output current harmonic component, motor loss and temperature increase.

When the carrier frequency is high, the motor loss and the motor temperature decrease, but the inverter loss, temperature and interference increase.

Adjusting the carrier frequency will have an impact on the following performance:

| | |
|---|---|
| Carrier frequency | low → high |
| Motor noise | large → small |
| Motor temperature rise | high → low |
| Inverter temperature rise | low → high |
| Output current waveform | bad → good |
| Leakage current | small → large |
| External radiation interference | small → large |

Table 6-1 Carrier frequency adjustment impact on performance

| | | | |
|---|---|---|---|
| F00.12 | PWM optimization | Setting range: 0～2 | Default value: 0 |

0: PWM optimization 1

SVPWM two-phase modulation, the motor runs at low frequency with small noise, high frequency with large noise.

1: PWM optimization 2

SVPWM two-phase modulation combined with three-phase modulation, the motor runs with small noise, but the inverter temperature rise is higher, derating is necessary.

2: PWM optimization 3

SVPWM three-phase modulation, the motor runs with large noise, but the motor oscillation is suppressed.

| | | | |
|---|---|---|---|
| F00.13 | AVR function | Setting range: 0～1 | Default value: 1 |

0: invalid

The duty cycle of the output voltage does not change.

1: valid

The output voltage duty cycle is automatically adjusted as the bus changes to ensure that the output voltage is constant.

| | | | |
|---|---|---|---|
| F00.14 | ACC time 0 | Setting range: 0.1～3000.0s | Default value: 20.0s |
| F00.15 | DEC time 0 | Setting range: 0.1～3000.0s | Default value: 20.0s |

ACC time 0: the time it takes for the inverter output frequency increasing from zero frequency to the maximum frequency (F00.06).

DEC time 0: the time it takes for the inverter output frequency decreasing from the maximum frequency to the zero frequency (F00.06).

A total of 4 groups of ACC/DEC time selection:

Group 0: F00.14, F00.15

Group 1: F13.03, F13.04

Group 2: F13.05, F13.06

Group 3: F13.07, F13.08

The ACC/DEC time can be selected by the multi-function digital input terminal (F06.01 ～ F06.08). Select the 4 groups of ACC/DEC time through the combination of the two terminals.

| ACC/DEC time selection 2 | ACC/DEC time selection 1 | ACC/DEC time selection | Corresponding parameters |
|---|---|---|---|
| OFF | OFF | ACC/DEC time 0 | F00.14/F00.15 |
| OFF | ON | ACC/DEC time 1 | F13.03/F13.04 |
| ON | OFF | ACC/DEC time 2 | F13.05/F13.06 |
| ON | ON | ACC/DEC time 3 | F13.07/F13.08 |

# 6.2 Motor parameters (F01 group)

| F01.00 | Inverter type | Setting range: 0～1 | Default value: Depend on model |
|---|---|---|---|

0: G type

1: P type

When the inverter is set to be P type, the inverter is amplified for use. But the overload capacity is weakened, it can only be used for light load occasions such as fans and water pumps, this time the inverter will be under light overload protection. When the inverter is set to be G type, the inverter must match the motor and the inverter will be under heavy overload protection.

Note: If you want to modify the parameter, the motor power and other parameters should also be manually modified as needed.

| F01.01 | Motor type | Setting range: 0～1 | Default value: 0 |
|---|---|---|---|

0: asynchronous motor

1: reserved

The current inverter only supports asynchronous motors.

| F01.02 | Rated power of | Setting range: 0.4 ～ | Default value: |
|---|---|---|---|

| | | | |
|---|---|---|---|
| | asynchronous motor | 3000.0kW | Depend on model |
| F01.03 | Rated frequency of asynchronous motor | Setting range: 10.00Hz～F00.06 | Default value: 50.00Hz |
| F01.04 | Rated speed of asynchronous motor | Setting range: 1～36000rpm | Default value: Depend on model |
| F01.05 | Rated voltage of asynchronous motor | Setting range: 0～500V | Default value: Depend on model |
| F01.06 | Rated current of asynchronous motor | Setting range: 0.8～3000.0A | Default value: Depend on model |

Set these parameters correctly according to the motor name plate.

| | | | |
|---|---|---|---|
| F01.07 | Stator resistance of asynchronous motor | Setting range: 0.001～65.535Ω | Default value: Depend on model |
| F01.08 | Rotor resistance of asynchronous motor | Setting range: 0.001～65.535Ω | Default value: Depend on model |
| F01.09 | Inductance of asynchronous motor | Setting range: 0.1～6553.5mH | Default value: Depend on model |
| F01.10 | Mutual inductance of asynchronous motor | Setting range: 0.1～6553.5mH | Default value: Depend on model |
| F01.11 | Non-load current of asynchronous motor | Setting range: 0.1～6553.5A | Default value: Depend on model |

These parameters can be obtained by motor parameter autotuning. The correctness of these parameters has a direct effect on the control performance of the motor.

| | | | |
|---|---|---|---|
| F01.12 | Motor parameters autotuning | Setting range: 0～2 | Default value: 0 |

0: no actuation

1: dynamic autotuning

In order to ensure the dynamic control performance of the inverter, select the

dynamic autotuning. The dynamic autotuning needs to decouple the motor and load (no load).

Select the dynamic autotuning, after completing the stator and rotor resistance identification, the motor will accelerate to 2/3 of the rated motor frequency in accordance with F00.14, maintain for a period of time, decelerate to zero speed in accordance with F00.15 and complete motor parameter dynamic autotuning.

2: static autotuning

It is suitable in cases where the load is difficult to decouple from the motor such as starters and elevators. Select the static autotuning, the motor will not rotate.

F00.01= 1, when F01.12 is set to 1 or 2, press the “ENT” key, the keypad displays “-RUN-”, the state LED flickers and then press the RUN key to confirm parameter autotuning. When the parameter autotuning is completed, the keypad displays the stop state. In the parameter autotuning process, you can press the “STOP” key to terminate the parameter autotuning. F01.12 will automatically clear after completing parameter autotuning.

Note: Make sure the parameters of the motor name plate (F01.02～F01.06) are set correctly before motor autotuning.

# 6.3 Start and stop control (F02 group)

| F02.00 | Start mode | Setting range: 0～2 | Default value: 0 |
|---|---|---|---|

0: start from the starting frequency

Start from the starting frequency (F02.02), after the hold time of starting frequency (F02.03), accelerate to the set frequency.

1: start after DC braking

The inverter carries out DC braking to the motor. The braking process is determined by F02.04 and F02.05. After the DC braking time arrival, the motor restarts according to the starting frequency.

2: start after rotating speed tracking

The inverter carries out speed identification to the rotating motor and starts at the rotating speed. In the starting process, the current and the voltage are smooth without impact.

| F02.01 | Start delay time (reserved) | Setting range: 0.0～80.00s | Default value: 0.0s |
|---|---|---|---|

When the run command is valid, the inverter will start running after delay time according to F02.01.

| | | | |
|---|---|---|---|
| F02.02 | Starting frequency | Setting range: 0.00 ～ 20.00Hz | Default value: 1.50Hz |
| F02.03 | Hold time of starting frequency | Setting range: 0.0～60.0s | Default value: 0.0s |

To ensure the torque at start-up, set the appropriate starting frequency. In addition, set up magnetic flux to wait for the start of the motor, so that the starting frequency maintains a certain time before acceleration. The starting frequency F02.02 is not limited by the lower limit frequency. When the frequency reference is less than the starting frequency, the inverter cannot start and keep in standby state. When switching forward running and reverse running, the hold time of starting frequency does not work.

| | | | |
|---|---|---|---|
| F02.04 | DC braking current before start | Setting range: 0.0～160.0% | Default value: 0.0% |
| F02.05 | DC braking time before start | Setting range: 0.0～60.0s | Default value: 0.0s |

DC braking current before start refers to motor rated current (F01.06).

DC braking time before start sets the operating time of the braking current.

The braking current before starting will affect the magnetic field strength of the fixed motor shaft. Increase the braking current value and then the heat generated by the motor in deceleration increases. Set the minimum DC braking current required for the fixed motor shaft.

| | | | |
|---|---|---|---|
| F02.06 | ACC and DEC mode | Setting range: 0～1 | Default value: 0 |

0: linear type

The output frequency (speed) rises or falls evenly, that is constant ACC/DEC mode. The ACC/DEC event varies according to the set ACC/DEC time.

The output frequency increases or decreases progressively at a constant slope as shown in the following figure:

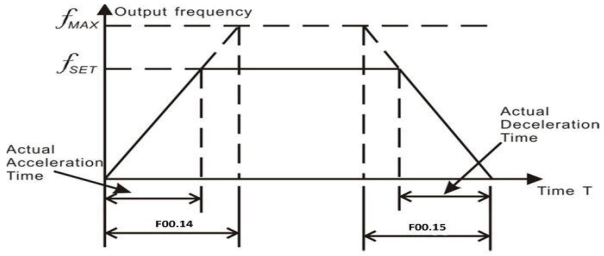


Figure 6-1 Constant ACC/DEC curve

1: S curve (reserved)

| | | | |
|---|---|---|---|
| F02.07 | Terminal characteristic selection after power on | Setting range: 0～1 | Default value: 0 |

When the run command selection (F00.01) is the terminal control, the system will automatically detect the status of the running terminal after power on.

0: run command is invalid

After power on, the inverter remains in stop state and it will not receive the terminal run command. If you need to run the inverter, all the terminal run commands should be cleared and then enable the terminal run command.

1: run command is valid

After power on, the inverter receives the terminal run command immediately.

| | | | |
|---|---|---|---|
| F02.08 | Restart after power off | Setting range: 0～1 | Default value: 0 |

0: no actuation

1: actuation

The inverter can run automatically when power on again after power off. Please use this function with caution.

| | | | |
|---|---|---|---|
| F02.09 | Power off restart waiting time | Setting range: 0.0 ～ 3000.0s | Default value: 0.0s |

If the inverter is running before power off, it will run automatically after power off restart waiting time (F02.09) after power failure.

| | | | |
|---|---|---|---|
| F02.10 | Stop mode | Setting range: 0～1 | Default value: 0 |

0: decelerate to stop

Decelerate to stop according to the set DEC time.

1: coast to stop

The inverter immediately blocks the pulse output and the load coasts to stop in accordance with the mechanical inertia.

| | | | |
|---|---|---|---|
| F02.11 | Dead time of FWD/REV | Setting range: 0.0～2000.0s | Default value: 0.0s |

When the inverter transforms between forward running and reverse running, the running frequency will drop to the starting frequency (F02.02) at first and then maintain the dead time of FWD/REV (F02.11). After the time, the inverter

switches to the opposite direction.

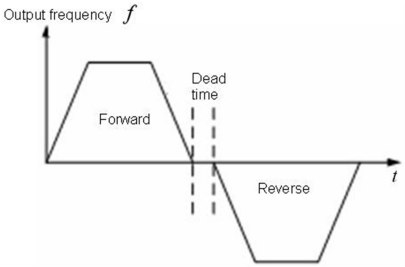



Figure 6-2 Forward and reverse dead time

| | | | |
|---|---|---|---|
| F02.12 | Starting frequency before stop DC braking | Setting range: 0.00 ～ F00.06 | Default value: 0.00Hz |
| F02.13 | Waiting time before stop DC braking | Setting range: 0.0～60.0s | Default value: 0.0s |
| F02.14 | Stop DC braking current | Setting range: 0.0 ～ 160.0% | Default value: 0.0% |
| F02.15 | Stop DC braking time | Setting range: 0.0～60.0s | Default value: 0.0s |

Starting frequency of stop braking: During deceleration, start the DC braking when running frequency reaches the starting frequency. If the value of stop braking starting frequency is 0 or lower than starting frequency (P1.02), DC braking is invalid; the variable frequency speed control system will coast to stop when running frequency reaches starting frequency.

Waiting time before DC braking: The system will block output before reaching starting frequency of stop braking during DEC and the DC braking will start after the waiting time, which prevents over-current fault caused by DC braking at high speed.

Stop DC braking current: The added DC braking current. The bigger the DC braking current, the larger the braking torque.

Stop DC braking time: The time for DC braking

| | | | |
|---|---|---|---|
| F02.16 | Frequency for deceleration to stop (reserved) | Setting range: F00.08 ～ 50.00Hz | Default value: 0.00Hz |
| F02.17 | Delay time of stop | Setting range: 0.0～100.0s | Default value: 0.0s |

| | | | |
|---|---|---|---|
| | frequency (reserved) | | |

When the inverter decelerates to stop and the frequency is reduced to the frequency for deceleration to stop (F02.16), the inverter will block the pulse output after delay time of stop frequency(F02.17).

| | | | |
|---|---|---|---|
| F02.18 | Actuation when running frequency is less than lower limit frequency | 0: run at lower limit frequency<br>1: stop<br>2: stand-by | Default value: 0 |

0: Run at lower frequency limit

1: stop

2: sleep standby

Select the operating status of the inverter when the set frequency is below the lower limit frequency. To avoid long-term low-speed motor running, you can use this function to choose to stop.

Note: The lower limit frequency larger than 0 is valid.

| | | | |
|---|---|---|---|
| F02.19 | Delay time of dormancy wake up | Setting range: 0.0～3000.0s | Default value: 0.0s |

During dormancy, after delay time of dormancy wake up, the inverter will enter into the running state.

# 6.4 V/F control (F03 group)

| | | | |
|---|---|---|---|
| F03.00 | V/F curve | Setting range: 0～2 | Default value: 0 |

0: straight line V/F curve. It is applicable for constant torque load.

1: multi-dots V/F curve. It is applicable for special load such as water extractors, centrifuges etc.

2: $2.0^{th}$ power low torque V/F curve. It is applicable for variable torque load such as fans, water pumps etc.

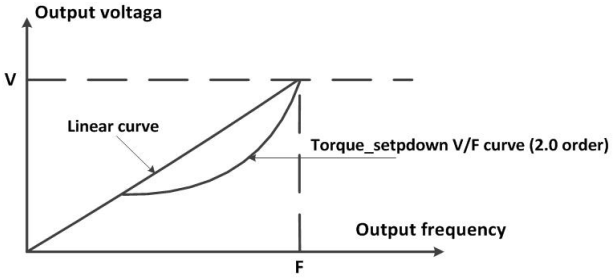



Figure 6-3 V/F curve

| | | | |
|---|---|---|---|
| F03.01 | Torque compensation | Setting range: 0.0 % (automatic)<br>0.1%～10.0% (manual) | Default value: 1.0% |
| F03.02 | Torque compensation cut-off | Setting range: 0.0%～50.0% | Default value: 20.0% |

F03.01 Torque compensation

Refer to the motor rated voltage (F01.05) to set the voltage compensation at zero frequency.

F03.02 Torque compensation cut-off

Refer to the motor rated frequency (F01.03) to set the torque compensation cut-off frequency.

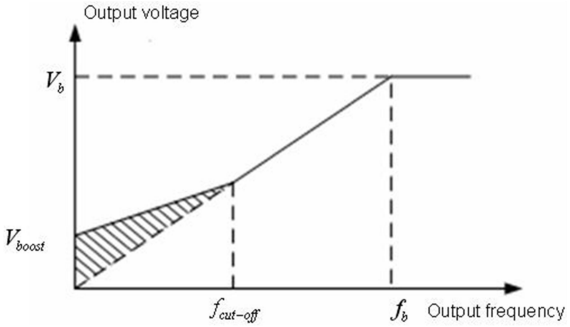



Figure 6-4 Torque compensation plot

Torque compensation can improve the V/F low-frequency torque characteristic. When the inverter is running below the torque compensation cut-off (F03.02*motor rated frequency), by increasing the output voltage, offsetting the

stator voltage drop and generate enough torque, ensure the motor runs normally.

The torque compensation amplitude should be set appropriately according to the load conditions, excessive compensation in startup will cause a great current impact.

| | | | |
|---|---|---|---|
| F03.03 | V/F frequency 1 | Setting range: 0.00～F03.05 | Default value: 0.00Hz |
| F03.04 | V/F voltage 1 | Setting range: 0.0% ～ 100.0% | Default value: 0.0% |
| F03.05 | V/F frequency 2 | Setting range: F03.03 ～ F03.07 | Default value: 0.00Hz |
| F03.06 | V/F voltage 2 | Setting range: 0.0% ～ 100.0% | Default value: 0.0% |
| F03.07 | V/F frequency 3 | Setting range: F03.05 ～ F01.03 | Default value: 0.00Hz |
| F03.08 | V/F voltage 3 | Setting range: 0.0% ～ 100.0% | Default value: 0.0% |

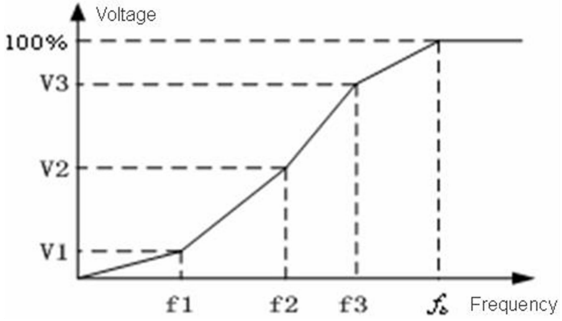



Figure 6-5 Multi-dots V/F curve

| | | | |
|---|---|---|---|
| F03.09 | Slip compensation gain | Setting range: 0.0 ～ 200.0% | Default value: 0.0% |

The motor's running torque changes with the load torque, which results in the variance of motor speed. The inverter's output frequency can be adjusted automatically through slip compensation according to the load torque. Therefore the change of speed due to the load change can be reduced.

Slip compensation frequency = sign * F03.09 * slip frequency * torque current/motor rated current, electric state symbol is +, power generation status symbol is -.

| | | | |
|---|---|---|---|
| F03.10 | Frequency threshold of surge suppression | Setting range: 0.00Hz ～ F01.06 | Default value: 30.00Hz |
| F03.11 | Low frequency surge suppression factor | Setting range: 0.0～1.0 | Default value: 0.2 |
| F03.12 | High frequency surge suppression factor | Setting range: 0.0～1.0 | Default value: 0.0 |

For high-power motors, the motor will surge badly at a certain frequency in V/F control. According to the oscillation frequency, F03.11 or F03.12 can be selected to improve the motor running. The larger the parameter, the larger the suppression effect of the motor surge. Whereas the set value is too large, it may aggravate the motor surge.

| | | | |
|---|---|---|---|
| F03.13 | Motor energy saving operation | Setting range: 0～1 | Default value: 0 |

0: invalid

1: valid

When the motor runs with no-load or light load in V/F control, the output voltage decreases along with the load reduces for automatic energy saving.

# 6.5 Vector control (F04 group)

| | | | |
|---|---|---|---|
| F04.00 | Low speed proportional gain | Setting range: 0～150 | Default value: 25 |
| F04.01 | Low speed integral time | Setting range: 0.01～15.00s | Default value: 0.60s |
| F04.02 | Low speed switching frequency | Setting range: 0.00Hz ～ F04.05 | Default value: 5.00Hz |
| F04.03 | High speed proportional gain | Setting range: 0～150 | Default value: 25 |
| F04.04 | High speed integral time | Setting range: 0.01～15.00 | Default value: 1.00s |

| | | | |
|---|---|---|---|
| F04.05 | High speed switching frequency | Setting range: F04.02 ～ F00.06 | Default value: 10.00Hz |

The speed loop PI adjustment is used to output the torque current so that the deviation of the speed command and the motor speed tends to zero.

F04.00/F04.03 proportional gain: when it increases, responsiveness will increase. Generally, the larger the load, the larger the set value is. Whereas the set value is too large, motor vibration occurs.

F04.01/F04.04 integral time: when it increases, responsiveness will decrease. Whereas the integral time is too short, motor vibration occurs.

F04.02/F04.05 switching frequency: the inverter calculates the current proportional gain and integral time according to the switching frequency.

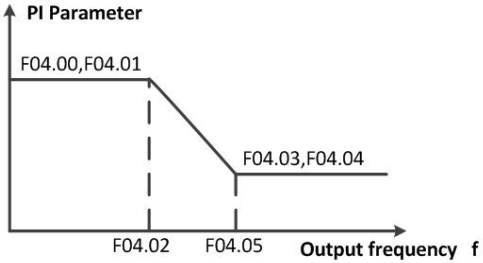



Figure 6-6 PI parameters and running frequency

When the running frequency is less than or equal to the low speed switching frequency (F04.02), the proportional gain is F04.00 and the integral time is F04.01;

When the running frequency is higher than the low speed switching frequency (F04.02) and less than the high speed switching frequency (F04.05), the proportional gain and the integral time are calculated according to the linear relationship;

When the running frequency is equal to or higher than the high speed switching frequency (F04.05), the proportional gain is F04.03 and the integral time is F04.04.

| | | | |
|---|---|---|---|
| F04.06 | VC slip compensation factor | Setting range: 50% ～ 200% | Default value: 100.0% |
| F04.07 | Reserved | Setting range: | Default value: |

The VC slip compensation factor is used to adjust the slip frequency of vector control and improve the speed stability of the system. Enlarge the parameter

when the motor speed is low at overload, otherwise reduce the parameter, which can suppress the speed static deviation effectively.

| | | | |
|---|---|---|---|
| F04.08 | Speed loop filter time | Setting range: 0ms ～ 100ms | Default value: 0ms |

In vector control mode, the speed loop regulator outputs torque current command, which is used to filter the torque command. The parameter is generally not adjusted. When speed fluctuation is large, increase the filter time; if the motor oscillates, it is necessary to reduce the parameter.

Speed loop filter time constant is small, the inverter output torque may change greatly, but the response is fast.

| | | | |
|---|---|---|---|
| F04.09 | Upper torque limit | Setting range: 0.0 ～ 200.0% | Default value: 150.0% |

When F04.09 selects the torque upper limit, 100.0% corresponds to the rated current of the inverter.

Note: G type inverter, default value: 150.0%, P type inverter, default value: 120.0%

| | | | |
|---|---|---|---|
| F04.10 | Torque setting | Setting range: 0～5 | Default value: 0 |

0: keypad (F04.11)

1: AI1

2: AI2

3: Pulse input HDI

4: Multi-step torque

5: 485 communication (1～5: 100% corresponds to 2 times of inverter rated current)

When F00.00 is set to 2 torque control, the inverter performs torque control, and it outputs the torque according to the set torque command. At this time, the output frequency automatically matches the speed of the load, but the output upper limit frequency is limited by F04. 12, when the load speed is larger than the set upper limit frequency, the inverter output frequency is limited, the output torque becomes smaller, the output torque will be different from the set torque, when the inverter output frequency to F04.12, the inverter keeps running at the upper limit frequency.

Torque control, when the set torque of the inverter is larger than the load torque, the inverter output frequency will rise, when the inverter output frequency reaches the upper limit, the inverter keeps running at the upper limit frequency; when the set torque of the inverter is less than the load torque, the inverter

output frequency will drop, when the inverter output frequency reaches the lower limit frequency, the inverter keep running at the lower limit frequency.

(1～5: corresponds to 200% of the inverter rated current).

| | | | |
|---|---|---|---|
| F04.11 | Keypad torque | Setting range: -200.0% ～ 200.0% | Default value: 50.0% |

F04.11 is relative to the rated current of the inverter.

| | | | |
|---|---|---|---|
| F04.12 | Upper limit frequency setting | Setting range: 0～5 | Default value: 0 |

0: keypad (F00.07)

1: AI1

2: AI2

3: Pulse input HDI

4: multi-step speed

5: 485 communication

(1～5: 100% corresponds to the Max. frequency)

| | | | |
|---|---|---|---|
| F04.13 | Min. excitation current (reserved) | Setting range: 0.0～50.0% | Default value: 10.0% |

When the motor speed is running above the rated speed, in order to maintain the output voltage stable, reduce the excitation current, the motor will enter the field weakening operation. When the motor is weakened, the minimum excitation current is 100.0% corresponding to F01.11 (motor no load current).

# 6.6 HMI interface (F05 group)

| | | | |
|---|---|---|---|
| F05.00 | Chinese and English language | Setting range: 0～1 | Default value: 0 |

0: Chinese

1: English (reserved)

| | | | |
|---|---|---|---|
| F05.01 | Parameter initialization | Setting range: 0～2 | Default value: 0 |

0: no actuation

1: restore default value.

2: clear the fault record.

| F05.02 | Parameter copy | Setting range: 0～1 | Default value: 0 |
|---|---|---|---|

0: reserved

1: reserved

| F05.03 | User password | Setting range: 0～65535 | Default value: 0 |
|---|---|---|---|

Protect the parameters of the inverter.

0000: no password protection.

1 ～ 65535: optional password. If you need to query and modify the inverter parameters, you must enter a matching password, only after the password verification, you can carry out the follow-up operation.

| F05.04 | Functions of MF key | Setting range: 0～4 | Default value: 0 |
|---|---|---|---|

0: left-shift key to switch display state

Combine with the “>>” key to switch the running or stop status monitoring parameters.

1: jogging running

The key MF sends the jog run command.

2: FWD/REV switch

The key MF sends a command to switch the direction of the frequency command, only valid for keypad control.

3: clear UP/DOWN setting

Clear the UP/DOWN setting.

4: non-factory parameter debugging

In this mode, you can only view the parameters that are not the same as the default values, so that you can quickly check the settings of the inverter.

| F05.05 | Stop function of STOP/RERST key | Setting range: 0～3 | Default value: 0 |
|---|---|---|---|

0: only valid for keypad control

1: valid for keypad and terminal control at the same time

2: valid for keypad and communication control at the same time

3: valid for all control modes

| F05.06 | Rotating speed display correction | Setting range: 0.1 ～ 999.9% | Default value: 100.0 |
|---|---|---|---|

It is used to correct the rotating speed display. After changing the rotating speed display correction, the displayed rotating speed = 60*running frequency * F05.06/(motor pole number*100.0)

| F05.07 | Linear speed display correction | Setting range: 0.1～999.9% | Default value: 1.0 |
|---|---|---|---|

It is used to correct the linear speed display. After changing the linear speed display correction, the displayed linear speed = mechanical rotating speed * F05.07

| F05.08 | Displayed parameters 1 when running | Setting range: 0 ～ 0xFFFF | Default value: 0X07FF |
|---|---|---|---|

BIT0: running frequency (Hz on)

BIT1: set frequency (Hz flickers)

BIT2: bus voltage (V on)

BIT3: output current (A on)

BIT4: output voltage (V on)

BIT5: rotating speed (rpm on)

BIT6: linear speed

BIT7: output power (% on)

BIT8: output torque (% on)

BIT9: input terminal status

BIT10: output terminal status

BIT11: PID reference (% on)

BIT12: PID feedback (% on)

BIT13: Pulse HDI frequency

BIT14: Count value

BIT15: PLC and current stage of multi-step speed

You need to correspond the displayed parameters to the BIT1, and then transform BIT0 ～ BIT15 into hexadecimal input F05.08. For example, in the running state, if you need to monitor the running frequency, output power and count value without other parameters displayed, transform the binary 0100000010000001 into hexadecimal 0x4081, set F05.08 to 4081.

| F05.09 | Displayed parameters 2 when running | Setting range: 0 ～ 0xFFFF | Default value: 0X0000 |
|---|---|---|---|

BIT0: torque setting (% on)

BIT1: keypad potentiometer AI0 (V on)

BIT2: analog input AI1 (V on)

BIT3: analog input AI2 (V on)

BIT4: motor overload percentage (% on)

BIT5: inverter overload percentage (% on)

BIT6～15: reserved

This parameter is used the same as F05.08. F05.08 is lower 16 bits and F05.09 is high 16 bits; when F05.08 movement judgment display is completed, F05.09 works, after F05.09 displays, automatically switch to bit0 of F05. 08.

| F05.10 | Displayed parameters 1 at stop | Setting range: 0 ～ 0xFFFF | Default value: 0X00FF |
|---|---|---|---|

BIT0: set frequency (Hz flickers)

BIT1: bus voltage (V on)

BIT2: input terminal status

BIT3: output terminal status

BIT4: keypad potentiometer AI0 (V on)

BIT5: analog input AI1 (V on)

BIT6: analog input AI2 (V on)

BIT7: Pulse HDI frequency (Hz on)

BIT8: PID reference (% on)

BIT9: PID feedback (% on)

BIT10: PLC and current stage of multi-step speed

BIT11: torque setting (% on)

BIT12～BIT15: reserved

This parameter is used the same as F05.08.

| F05.11 | Inverter rated power | Setting range: 0.4 ～ 3000.0kW | Displays the rated power of the drive |
|---|---|---|---|
| F05.12 | Inverter rated | Setting range: 0.0 ～ | Displays the drive rated |

| | | | |
|---|---|---|---|
| | current | 3000.0A | current |
| F05.13 | Converting module temperature | Setting range: -20.0 ～ 100.0℃ | Displays the inverter module temperature |
| F05.14 | Rectification bridge temperature | Setting range: -20.0 ～ 100.0℃ | Displays the rectifier module temperature |
| F05.15 | Software version | Setting range: 0.00 ～ 655.35 | Display control software version number |
| F05.16 | Accumulative running time | Setting range: 0 ～ 65535h | Displays the machine's running time |

# 6.7 Input terminals (F06 group)

| | | | |
|---|---|---|---|
| F06.00 | HDI input mode | Setting range: 0～1 | Default value: 0 |

0: pulse input

HDI is configured for high-speed pulse capture ports

1: switch input

HDI as a normal DI port to configure

| | | | |
|---|---|---|---|
| F06.01 | Functions of DI1 terminal | Setting range: 0～39 | Default value: 1 |
| F06.02 | Functions of DI2 terminal | Setting range: 0～39 | Default value: 4 |
| F06.03 | Functions of DI3 terminal | Setting range: 0～39 | Default value: 7 |
| F06.04 | Functions of DI4 terminal | Setting range: 0～39 | Default value: 0 |
| F06.05 | Functions of DI5 terminal | Setting range: 0～39 | Default value: 0 |
| F06.06 | Functions of DI6 terminal | Setting range: 0～39 | Default value: 0 |
| F06.07 | Functions of DI7 terminal | Setting range: 0～39 | Default value: 0 |

| F06.08 | Functions of HDI terminal switch input | Setting range: 0～39 | Default value: 0 |
|---|---|---|---|

These parameters are used to set the function of the digital multi-function input terminal. The functions that can be selected are shown in the following table:

| Set the value | Features | Description |
|---|---|---|
| 0 | Invalid | Please set unused terminals to be invalid to avoid malfunction. |
| 1 | Forward running | Control the inverter operation through external terminals. |
| 2 | Reverse running | |
| 3 | Forward jogging | Please refer to description of F13.00～F13.02. |
| 4 | Reverse jogging | |
| 5 | Three-wire running | Please refer to description of F06.10. |
| 6 | Coast to stop | The inverter blocks the output immediately. The motor coasts to stop by its mechanical inertia. |
| 7 | Fault reset | Resets faults that have occurred. It has the same function as STOP/RST. |
| 8 | Emergency stop | Reserved |
| 9 | External fault input | Stop the inverter and output a alarm when a fault occurs in a peripheral device. |
| 10 | Run pause | When this terminal takes effect, inverter decelerates to stop and save current status, such as PLC, traverse frequency and PID. When this terminal takes no effect, inverter restores the status before pause. |
| 11 | Terminal UP | When the frequency is set by external terminals, increase or decrease the reference frequency progressively; when the frequency is set to digital setting, the setting frequency can be adjusted up and down; F06.11 can adjust the change rate of UP/DOWN. |
| 12 | Terminal DOWN | |
| 13 | UP/DOWN setting clear | When the terminal is valid, it can clear the UP/DOWN setting and restore the frequency to the original set frequency. |
| 14 | UP/DOWN setting cleared temporarily | When the terminal switches on, clear the UP/DOWN setting, restore the frequency to the frequency given by the frequency command channel; when the terminal switches off, return to the UP/DOWN setting. |

<table>
<tr><th>Set the value</th><th>Features</th><th>Description</th></tr>
<tr><td>15</td><td>Multi-step speed pause</td><td>Shield the function of multi-speed terminals and keep the set value as the current status.</td></tr>
<tr><td>16</td><td>Multi-step speed terminal 1</td><td rowspan="4">16 steps speed control can be realized by the combination of these four terminals.<br>Note: Multi-step speed 1 is the low bit and multi-step speed 4 is high bit.<br><table><tr><td>Multi-step speed 4</td><td>Multi-step speed 3</td><td>Multi-step speed 2</td><td>Multi-step speed 1</td></tr><tr><td>BIT3</td><td>BIT2</td><td>BIT1</td><td>BIT0</td></tr></table></td></tr>
<tr><td>17</td><td>Multi-step speed terminal 2</td></tr>
<tr><td>18</td><td>Multi-step speed terminal 3</td></tr>
<tr><td>19</td><td>Multi-step speed terminal 4</td></tr>
<tr><td>20</td><td>Simple PLC stop reset</td><td>Restart simple PLC and clear the memory state of PLC.</td></tr>
<tr><td>21</td><td>Simple PLC pause</td><td>Program pause during PLC implement. Run at the current speed step. After cancel the function, simple PLC continues to run.</td></tr>
<tr><td>22</td><td>X setting and Y setting switching</td><td rowspan="3">The function can realize the switching between the frequency setting channels.</td></tr>
<tr><td>23</td><td>(X+Y) setting and X setting switching</td></tr>
<tr><td>24</td><td>(X+Y) setting and Y setting switching</td></tr>
<tr><td>25</td><td>ACC/DEC time selection 1</td><td rowspan="2">Select four groups of ACC/DEC time by the combination of the two terminals:<br><table><tr><td>Terminal 2</td><td>Terminal 1</td><td>ACC/DEC time selection</td><td>Corresponding parameter</td></tr><tr><td>OFF</td><td>OFF</td><td>ACC/DEC time 0</td><td>F00.14/F00.15</td></tr><tr><td>OFF</td><td>ON</td><td>ACC/DEC time 1</td><td>F13.03/F13.04</td></tr><tr><td>ON</td><td>OFF</td><td>ACC/DEC time 2</td><td>F13.05/F13.06</td></tr><tr><td>ON</td><td>ON</td><td>ACC/DEC time 3</td><td>F13.07/F13.08</td></tr></table></td></tr>
<tr><td>26</td><td>ACC/DEC time selection 2</td></tr>
<tr><td>27</td><td>ACC/DEC disabled</td><td>Ensure that the inverter is not affected by external signals (except for the stop command) and maintain the current output frequency.</td></tr>
</table>

| Set the value | Features | Description |
|---|---|---|
| 28 | Torque control disabled | Switch form torque control mode to speed control mode. |
| 29 | Counter triggered | Enable the pulse counter. |
| 30 | PID control pause | Temporary PID invalid and the inverter will output at the current frequency. |
| 31 | Wobble pause (at the current frequency) | The inverter will stop at the current output and after canceling the function, the inverter will continue wobble at the current frequency. |
| 32 | Wobble reset (return to center frequency) | The setting frequency of the inverter will come back to the center frequency. |
| 33 | Counter reset | The counter status is cleared. |
| 34～39 | Reserved | Reserved |

Table 6-2 Functions of multi-function input terminals

| F06.09 | DI terminal filter time | Setting range: 1～15 | Default value: 0 |
|---|---|---|---|

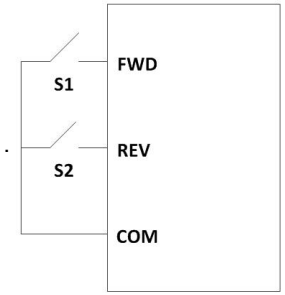
Set the sensitivity of the DI terminal. If the digital input terminal is easy to be interfered and cause malfunction, this parameter can be increased to improve the anti-interference capability, whereas at the same time the sensitivity of the DI terminal will be reduced.

| F06.10 | Terminal control running mode | Setting range: 1～3 | Default value: 0 |
|---|---|---|---|

Set the terminal control running mode.

0: two-wire control mode 1

Enabling and direction are combined together. This is the most frequently used two-wire mode. Whether the motor is forward or reverse running is determined by FWD and REV terminal commands.

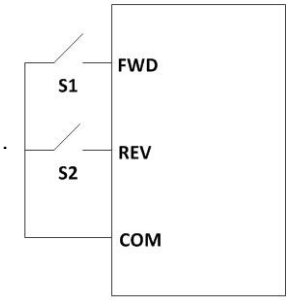



| FWD | REV | Run command |
|---|---|---|
| OFF | OFF | Stop |
| ON | OFF | FWD run |
| OFF | ON | REV run |
| ON | ON | No action |

Figure 6-7 Two-wire control

1: two-wire control mode 2

Enabling is separated from direction. START/STOP command is determined by FWD terminal. Direction is determined by REV terminal.

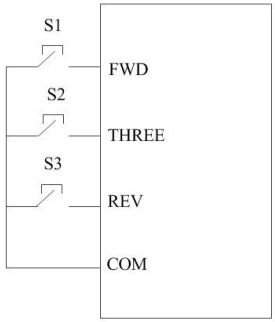



| FWD | REV | Run command |
|---|---|---|
| OFF | OFF | Stop |
| ON | OFF | FWD run |
| OFF | ON | Stop |
| ON | ON | REV run |

Figure 6-8 two-wire control 2

2: three-wire control mode 1

This mode defines the three-wire running terminal (THREE) as the enabling terminal. The running command will be generated by FWD and the direction will be controlled by REV. When THREE switches off, the system will stop.

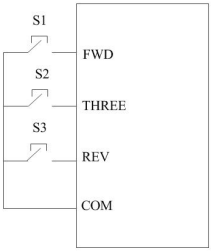



| THREE | REV | Previous running direction | Current running direction |
|---|---|---|---|
| ON | OFF→ ON | FWD run | REV run |
| | | REV run | FWD run |
| ON | ON→ OFF | FWD run | REV run |
| | | REV run | FWD run |
| ON→ OFF | --------- | --------- | Decelerate to stop |

Figure 6-9 three-wire control 1

3: three-wire control mode 2

This mode defines the three-wire running terminal (THREE) as the enabling terminal. The running command will be generated by FWD and REV, and both control the running direction at the same time. When THREE switches off, the system will stop.




| THREE | FWD | REV | Current running direction |
|---|---|---|---|
| ON | OFF→ ON | --------- | FWD run |
| ON | --------- | ON→ OFF | REV run |
| ON→ OFF | --------- | --------- | Decelerate to stop |

Figure 6-10 three-wire control 2

Note: S1: FWD running switch S2: stop button S3: REV running switch

| | | | |
|---|---|---|---|
| F06.11 | Adjust step length of terminal UP/DOWN frequency | Setting range: 0.0150.00Hz/s | Default value: 0.50H/s |

Use the terminal UP/DOWN to adjust the set frequency, frequency change speed, that is, the amount of frequency change per second.

| | | | |
|---|---|---|---|
| F06.12 | Adjust control of keypad and terminal UP/DOWN frequency | Setting range: 0～3 | Default value: 0 |

0: valid, hold on after power off; when the inverter stops, UP/DOWN settings are saved; after power on again, UP/DOWN settings and the current frequency are

overlaid.

1: valid, clear after power off

2: invalid

3: valid in running, clear after power off

| | | | |
|---|---|---|---|
| F06.13 | Keypad potentiometer AI0 lower limit | Setting range: 0.00 ~ 10.00V | Default value: 0.00V |
| F06.14 | Corresponding setting of keypad potentiometer AI0 lower limit | Setting range: -100.0 ~ 100.0% | Default value: 0.0% |
| F06.15 | Keypad potentiometer AI0 upper limit | Setting range: 0.00 ~ 10.00V | Default value: 10.00V |
| F06.16 | Corresponding setting of keypad potentiometer AI0 upper limit | Setting range: -100.0 ~ 100.0% | Default value: 100.0% |
| F06.17 | Keypad potentiometer AI0 filter time | Setting range: 0.00 ~ 10.00s | Default value: 0.10s |
| F06.18 | AI1 lower limit | Setting range: 0.00 ~ 10.00V | Default value: 0.00V |
| F06.19 | Corresponding setting of AI1 lower limit | Setting range: -100.0 ~ 100.0% | Default value: 0.0% |
| F06.20 | AI1 upper limit | Setting range: 0.00 ~ 10.00V | Default value: 10.00V |
| F06.21 | Corresponding setting of AI1 upper limit | Setting range: -100.0 ~ 100.0% | Default value: 100.0% |
| F06.22 | AI1 input filter time | Setting range: 0.00 ~ 10.00s | Default value: 0.10s |
| F06.23 | AI2 lower limit | Setting range: -10.00 ~ 10.00V | Default value: 0.00V |
| F06.24 | Corresponding setting of AI2 lower limit | Setting range: -100.0 ~ 100.0% | Default value: 0.0% |

| | | | |
|---|---|---|---|
| F06.25 | AI2 upper limit | Setting range: -10.00～10.00V | Default value: 10.00V |
| F06.26 | Corresponding setting of AI2 upper limit | Setting range: -100.0～100.0% | Default value: 100.0% |
| F06.27 | AI2 input filter time | Setting range: 0.00～10.00s | Default value: 0.10s |

The parameters determine the relationship between input voltage and the corresponding setting value. When the analog input voltage exceeds the range between lower limit and upper limit, it will be regarded as the upper limit or lower limit.

Input filter time: the larger the value, the stronger the anti-interference capability and the lower the sensitivity; the smaller the value, the higher the analog input sensitivity and the weaker the anti-interference capability.

Analog AI1～AI2 can support 0～10V/0～20mA input through the external DIP switch selection, for 0～20mA input, 20mA corresponds to 5V.

The following figure is about the relationship between analog input and corresponding setting.

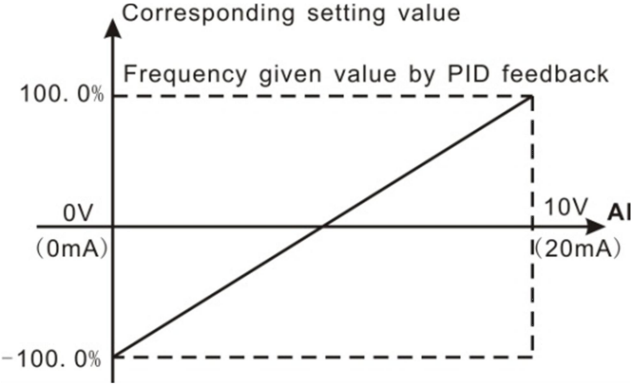



Figure 6-11 Relationship between analog input and corresponding setting

| | | | |
|---|---|---|---|
| F06.28 | HDI lower limit frequency | Setting range: 0.00～50.00kHz | Default value: 0.00kHz |
| F06.29 | Corresponding setting of HDI lower limit frequency | Setting range: -100.0～100.0% | Default value: 0.0% |

| | | | |
|---|---|---|---|
| F06.30 | HDI upper limit frequency | Setting range: 0.00 ～ 50.00kHz | Default value: 50.00kHz |
| F06.31 | Corresponding setting of HDI upper limit frequency | Setting range: -100.0 ～ 100.0% | Default value: 100.0% |
| F06.32 | HDI frequency input filter time | Setting range: 0.00 ～ 10.00s | Default value: 0.10s |

The function codes define the relationship between HDI pulses as the input mode and the analog input.

# 6.8 Output terminals (F07 group)

| | | | |
|---|---|---|---|
| F07.00 | HDO output mode | Setting range: 0～1 | Default value: 0 |

0: pulse output

HDO terminal is a programmable multiplexing terminal. The maximum pulse frequency is 50.00kHz for pulse input. For related functions, refer to F07.07.

1: open collector output

For related functions, refer to F07.01.

| | | | |
|---|---|---|---|
| F07.01 | HDO open collector output | Setting range: 0～20 | Default value: 1 |
| F07.02 | DO collector output | Setting range: 0～20 | Default value: 4 |
| F07.03 | Relay T1 output | Setting range: 0～20 | Default value: 5 |
| F07.04 | Relay T2 output | Setting range: 0～20 | Default value: 0 |

0: no output

1: running

The output signal is valid when the inverter is running.

2: fault output

The output signal is valid when the inverter is in fault.

3: frequency level detection FDT output

When the output frequency of the inverter is at the upper bound of FDT level, the output signal is valid; when the output frequency is at the lower bound of FDT level, the output signal is invalid.

4: forward running

The output signal is valid when the inverter is running forward.

5: reverse running

The output signal is valid when the inverter is running reversely.

6: ready to run

When the main circuit and control circuit power are applied and the inverter is in the running state, the output signal is valid.

7: frequency arrival

When the deviation between the output frequency of the inverter and the set frequency is in the range of frequency arrival detection amplitude, the output signal is valid.

8: zero speed running

When the inverter output frequency and set frequency are zero and the inverter is running, the output signal is valid.

9: upper limit frequency arrival

When the inverter output frequency reaches the upper limit frequency, the output signal is valid.

10: lower limit frequency arrival

When the inverter output frequency reaches the lower limit frequency, the output signal is valid.

11: overload pre-alarm

F08.04 = 1 or 3, the ON signal is output and the overload parameter is set to F08.02 to F08.03 when the overload warning detection warning time is exceeded.

F08.03 = 2 or 4, the output current is larger than the inverter overload warning point and hold time is larger than the overload warning detection time, the output signal is valid, overload parameter is set in F08.02～F08.03.

12: set count value arrival

When the count value reaches the set count value (F10.07), the output signal is valid.

13: specified count value arrival

When the count value reaches the specified count value (F10.08), the output

signal is valid.

14: simple PLC stage is completed

15: simple PLC cycle is completed

16: running time arrival

The inverter has accumulated more than F13.17 and the output signal is valid.

17～20: reserved

| | | | |
|---|---|---|---|
| F07.05 | AO1 output | Setting range: 0～12 | Default value: 0 |
| F07.06 | AO2 output | Setting range: 0～12 | Default value: 0 |
| F07.07 | HDO open collector high-speed pulse output | Setting range: 0～12 | Default value: 0 |

0: running frequency

0～maximum output frequency

1: ramp reference

2: set frequency

0～maximum output frequency

3: rotating speed

0～2 times of the motor rated speed

4: output current

0～2 times of the inverter rated current

5: output voltage

0～1.5 times of the inverter rated voltage

6: output power

0～2 times of the rated power

7: output torque

0～2 times of the motor rated current

8: set torque

9: keypad potentiometer

10: AI1

0～10V

11: AI2

12: pulse frequency HDI

0.1Hz to 50.00kHz

| | | | |
|---|---|---|---|
| F07.08 | Corresponding setting of AO1 output lower limit | Setting range: 0.0 ～ 100.0% | Default value: 0.0% |
| F07.09 | AO1 output voltage (current) lower limit | Setting range: 0.00 ～ 10.00V | Default value: 0.00V |
| F07.10 | Corresponding setting of AO1 output upper limit | Setting range: 0.0 ～ 100.0% | Default value: 100.0% |
| F07.11 | AO1 output voltage (current) upper limit | Setting range: 0.00 ～ 10.00V | Default value: 10.00V |
| F07.12 | Corresponding setting of AO2 output lower limit | Setting range: 0.0 ～ 100.0% | Default value: 0.0% |
| F07.13 | AO2 output voltage (current) lower limit | Setting range: 0.00 ～ 10.00V | Default value: 0.00V |
| F07.14 | Corresponding setting of AO2 output upper limit | Setting range: 0.0 ～ 100.0% | Default value: 100.0% |
| F07.15 | AO2 output voltage (current) upper limit | Setting range: 0.00 ～ 10.00V | Default value: 10.00V |
| F07.16 | Corresponding setting of HDO output lower limit | Setting range: 0.0 ～ 100.0% | Default value: 0.0% |
| F07.17 | HDO output lower limit | Setting range: 0.00 ～ 50.00kHz | Default value: 0.00kHz |
| F07.18 | Corresponding setting of HDO output upper limit | Setting range: 0.0 ～ 100.0% | Default value: 100.0% |
| F07.19 | HDO output upper limit | Setting range: 0.00 ～ 50.00kHz | Default value: 50.00kHz |

Above function codes define the relationship between high-speed pulse output frequency and the corresponding output value. When the output value exceeds the range between lower limit and upper limit, it will be calculated as the upper limit or lower limit.

For different applications, the corresponding value of 100.0% high speed pulse output is different. For details, please refer to description of each application.

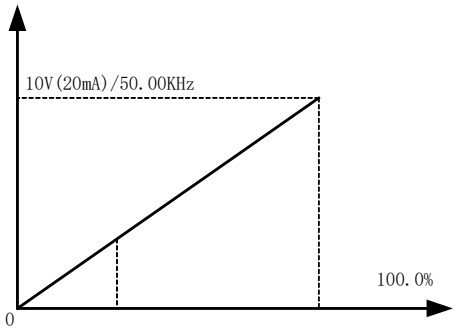



Figure 6-12 Relationship between HDO and corresponding setting

# 6.9 Fault and protection (F08 group)

| | | | |
|---|---|---|---|
| F08.00 | Motor overload protection | Setting range: 0～2 | Default value: 0 |

0: No protection

1: ordinary motor (with low speed compensation): the cooling effect of ordinary motor at low speed is bad; compared with the variable frequency motor, its current overload protection time should be shortened.

2: variable frequency motor (without low speed compensation): the cooling effect has nothing to do with the running frequency.

| | | | |
|---|---|---|---|
| F08.01 | Motor overload protection factor | Setting range: 20.0 ～ 120.0% | Default value: 100.0% |

Refer to the motor rated current. Set the allowable maximum load current.

Maximum load current = F08.01 * motor rated current

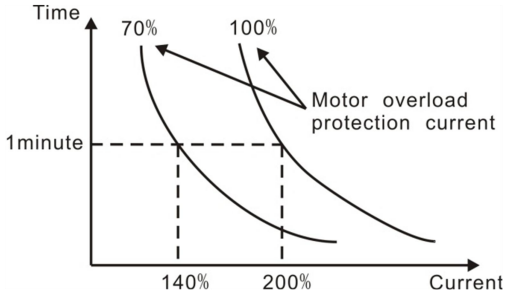



Figure 6-13 Overload protection time and current ratio

The time for the ordinary motor should be shortened appropriately according to the frequency.

Overload current output ratio = (inverter output current/maximum load current) * 100%

When the overload current output ratio is less than or equal to 221%, the time is calculated according to the curve.

When the overload current output ratio is larger than 221% and less than or equal to 410%, the time is 50s.

When the overload current output ratio is larger than 410%, the fault E.OL1 is reported immediately.

| | | | |
|---|---|---|---|
| F08.02 | Motor overload warning point | Setting range: 10.0 ～ 200.0% | Default value: Depend on model |

Set the current threshold for current overload operation relative to the rated current of the inverter.

| | | | |
|---|---|---|---|
| F08.03 | Motor overload warning detection time | Setting range: 0.1～60.0s | Default value: 0.1s |

When the inverter output current is larger than the current overload warning point and the duration exceeds the current overload detection time, the current preload alarm terminal outputs the signal.

| | | | |
|---|---|---|---|
| F08.04 | Overload warning actuation selection | Setting range: 0～4 | Default value: 1 |

0: no detection

1: overload warning is valid in running, continue to run

2: overload warning is valid in running, alarm (E.oL3) and stop

3: overload warning is valid in constant speed running, continue to run after

detection

4: overload warning is valid in constant speed running, alarm (E.oL3) and stop after detection

| | | | |
|---|---|---|---|
| F08.05 | Overvoltage stall selection | Setting range: 0～1 | Default value: 1 |

0: disabled

1: enabled

| | | | |
|---|---|---|---|
| F08.06 | Overvoltage stall protection voltage | Setting range: 110～150% | Default value: 135% |

During DEC running of the inverter, due to load inertia, the actual decreasing ratio of the motor speed is lower than the decreasing ratio of output frequency. At this time, the motor will feedback energy to the inverter, which will make the bus voltage increase.

When the bus voltage exceeds the overvoltage stall protection voltage (F08.06), the inverter will stop DEC running until the bus voltage becomes normal.

| | | | |
|---|---|---|---|
| F08.07 | Overcurrent stall protection current | Setting range: 50～200% | Default value: 160% |

Refer to the inverter rated current to calculate the current threshold of overcurrent stall protection.

| | | | |
|---|---|---|---|
| F08.08 | Overcurrent stall frequency decreasing ratio | Setting range: 0.00～50.00Hz/s | Default value: 10.00 |

During ACC running of the system, due to heavy load, the actual increasing ratio of the motor speed is lower than the increasing ratio of output frequency. The trips of the system will be caused by the ACC overcurrent fault if there are not any measures.

If the output current is larger than the overcurrent stall protection current (F08.07) during acceleration, the output frequency is reduced according to the overcurrent stall frequency decreasing ratio (F08.08) matching with the running frequency to avoid overcurrent. When the output current becomes normal, the inverter continues to accelerate.

| | | | |
|---|---|---|---|
| F08.09 | Overcurrent stall actuation selection | Setting range: 0～1 | Default value: 0 |

0: always valid

1: invalid at constant speed

| | | | |
|---|---|---|---|
| F08.10 | Frequency decreasing point at sudden power loss | Setting range: 70.0～110.0% | Default value: 80.0% |
| F08.11 | Frequency decreasing ratio at sudden power loss | Setting range: 0.00Hz /s ～ F00.06 | Default value: 0.00Hz |

After the grid powers off, bus voltage decreases to frequency decreasing point at sudden power loss. Then the inverter begins decreasing running frequency according to F08.11 to keep the motor in power generation and make the feedback energy maintain the bus voltage. The inverter will work properly until power on again.

| | | | |
|---|---|---|---|
| F08.12 | Input phase loss protection | Setting range: 0～1 | Default value: 1 |

0: disabled

1: enabled

Set whether to protect at the input phase loss.

| | | | |
|---|---|---|---|
| F08.13 | Output phase loss protection | Setting range: 0～1 | Default value: 1 |

0: disabled

1: enabled

Set whether to protect at the output phase loss.

| | | | |
|---|---|---|---|
| F08.14 | Automatic reset times | Setting range: 0～3 | Default value: 0 |
| F08.15 | Automatic reset interval | Setting range: 0.1 ～ 100.0s | Default value: 1.0s |

This function enables the automatic reset of general faults. The inverter will automatically restart after automatic reset interval (F08.15).

If the reset times exceed the automatic reset times (F08.14), the inverter will not reset fault after a fault occurs again.

| | | | |
|---|---|---|---|
| F08.16 | Previous 2 fault type | Setting range: 0～25 | |
| F08.17 | Previous fault type | Setting range: 0～25 | |
| F08.18 | Current fault type | Setting range: 0～25 | |

0: no fault

1: ACC overcurrent (E.oC1)

2: DEC overcurrent (E.oC2)

3: constant speed overcurrent (E.oC3)

4: ACC overvoltage (E.oU1)

5: DEC overvoltage (E.oU2)

6: constant speed overvoltage (E.oU3)

7: bus undervoltage fault (E.Lv)

8: inverter unit U phase protection (E.oUT1)

9: inverter unit V phase protection (E.oUT2)

10: inverter unit W phase protection (E.oUT3)

11: motor overload (E.oL1)

12: inverter overload (E.oL2)

13: overload pre-warning fault (E.oL3)

14: radiator 1 overheating (E.oH1)

15: radiator 2 overheating (E.oH2)

16: input side phase loss (E.ILF)

17: output side phase loss (E.oLF)

18: braking unit fault (E.bC)

19: autotuning fault (E.AUT)

20: PID disconnection fault (E.PIDE)

21: communication failure (E.485)

22: external fault (E.EF)

23: EEPROM operation failure (E.EPR)

24: run time arrival (E.ENd)

25: current detection fault (E.ITE)

| | | | |
|---|---|---|---|
| F08.19 | Frequency at current fault | Display the frequency at the current fault | |
| F08.20 | Current at current fault | Display the current at the current fault | |

<table>
<tr><td>F08.21</td><td>Bus voltage at current fault</td><td colspan="4">Display the bus voltage at the current fault</td></tr>
<tr><td>F08.22</td><td>Input terminal state at current fault</td><td colspan="4">This value is displayed in decimal digits. Display the state of all digital input terminals in the current fault.<table><tr><td>BIT3</td><td>BIT2</td><td>BIT1</td><td>BIT0</td></tr><tr><td>DI4</td><td>DI3</td><td>DI2</td><td>DI1</td></tr><tr><td>BIT7</td><td>BIT6</td><td>BIT5</td><td>BIT4</td></tr><tr><td>HDI</td><td>DI7</td><td>DI6</td><td>DI5</td></tr></table>According to each state transformed into the corresponding decimal display, when the input terminal is ON, its corresponding value is 1, OFF is 0.</td></tr>
<tr><td>F08.23</td><td>Output terminal state at current fault</td><td colspan="4">This value is displayed in decimal digits. Display the state of the output terminal at the current fault.<table><tr><td>BIT3</td><td>BIT2</td><td>BIT1</td><td>BIT0</td></tr><tr><td>T2</td><td>T1</td><td>DO</td><td>HDO</td></tr></table>According to each state transformed into the corresponding decimal display, when the output terminal is ON, its corresponding value is 1, OFF is 0.</td></tr>
</table>

# 6.10 PID control (F09 group)

PID control is a common method used in process control, such as flow, pressure and temperature control. The principle will firstly detect the bias between preset value and feedback value, then calculate output frequency of the system according to proportional gain, integral and differential time. Please refer to following figure:

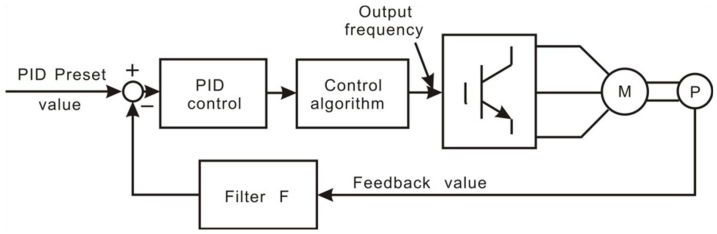



Figure 6-14 PID control

In the system, the PID control is valid only when the X frequency source reference selection (F0.04) or the Y frequency source reference selection (F0.05)

is the PID control reference.

| F09.00 | PID reference channel | Setting range: 0～5 | Default value: 0 |
|---|---|---|---|

0: digital reference (F09.01)

1: AI1

2: AI2

3: HDI

4: multi-step speed

5: 485 communication

When the frequency source selects PID, the parameter decides the target reference channel for the process PID. Reference target of the process PID is a relative value, 100% of preset value corresponds to 100% of feedback value. The system operates in relative value (0~100%).

| F09.01 | PID keypad reference | Setting range: 0.0～100.0% | Default value: 0.0% |
|---|---|---|---|

When the PID reference channel (F09.00) is 0, this value is PID reference.

| F09.02 | PID feedback channel | Setting range: 0～4 | Default value: 0 |
|---|---|---|---|

0: AI1

1: AI2

2: AI1+AI2

3: HDI

4: 485 communication

| F09.03 | PID direction | Setting range: 0～1 | Default value: 0 |
|---|---|---|---|

0: positive

When the feedback signal is larger than the PID reference, the inverter output frequency is required to decrease in order to make the PID to balance, such as winding tension PID control.

1: negative

When the feedback signal is larger than the PID reference, the inverter output frequency is required to increase in order to make the PID balance, such as unwinding tension PID control.

| | | | |
|---|---|---|---|
| F09.04 | PID output upper limit (reserved) | Setting range: -100.0 ～ 100.0% | Default value: 100.0% |
| F09.05 | PID output lower limit (reserved) | Setting range: -100.0 ～ 100.0% | Default value: 0.0 |

F09.04 PID output setting frequency or voltage upper limit.

F09.05 PID output setting frequency or voltage lower limit.

| | | | |
|---|---|---|---|
| F09.06 | Proportional gain P | Setting range: 0.00 ～ 100.00 | Default value: 0.10 |
| F09.07 | Integral time I | Setting range: 0.01 ～ 10.00s | Default value: 0.10s |
| F09.08 | Differential time D | Setting range: 0.00 ～ 10.00s | Default value: 0.00s |

Proportional gain (P): When the feedback and preset have offset, the adjustment is proportional to the offset. The offset is constant, so is the adjustment. Proportional gain can respond to feedback changes but only proportional gain cannot achieve floating control. The larger the proportional gain, the higher the adjusting speed. Too large P may cause oscillation. Set the integral time quite long and differential time to zero, make the system run through proportional gain, change the preset value and check the offset of the feedback and the preset. If the offset is in the direction of the preset variation, continue to increase proportional gain; otherwise, decrease it. Repeat the operation till the offset is much smaller.

Integral time (I): When the feedback and preset have offset, the adjustment is accumulated continuously. If the offset remains, increase the adjustment till no offset. Integral controller can effectively eliminate offset, the smaller the integral time, the stronger the effect. However, too strong integral effect may cause repeated over adjustment and even oscillation. Adjust the integral time from large to small gradually and check the effect till the speed of the system becomes stable.

Differential time (D): When the feedback and preset have offset, the adjustment is proportional to the offset. The adjustment is only related to the direction and size of offset variation and it has nothing to do with offset. When the feedback signal changes, differential time is used to perform adjustment based on variations and thus suppress feedback signal change, the larger the differential time, the stronger the effect. Please use differential controller with cautions, because the adjustment can easily enlarge system interference, especially interference with frequent change.

| | | | |
|---|---|---|---|
| F09.09 | Sampling cycle T | Setting range: 0.00 ～ | Default value: |

| | | | |
|---|---|---|---|
| | | 100.00s | 0.10s |

Set the sampling cycle of the feedback signal, the smaller the parameter, the faster the system responds to the reference and feedback deviation. The faster the sampling cycle has high requirements on the association of the system PID gain and may lead to system oscillation.

| | | | |
|---|---|---|---|
| F09.10 | PID control deviation limit | Setting range: 0.0～100.0% | Default value: 0.0 |

When the absolute value of the PID control error <F09.10, the PID stops the adjustment; conversely, the PID regulates the output.

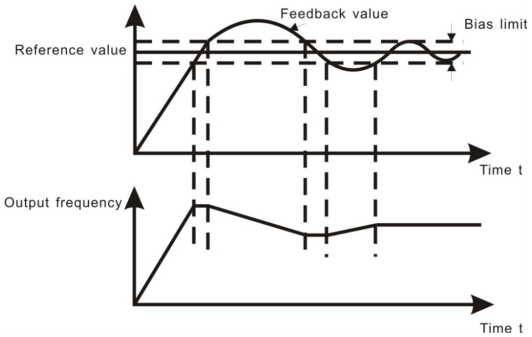



Figure 6-15 Process PID control

| | | | |
|---|---|---|---|
| F09.11 | Feedback loss detection value | Setting range: 0.0～100.0% | Default value: 0.0% |
| F09.12 | Feedback loss detection time | Setting range: 0.0～3000.0s | Default value: 1.0s |

When the PID feedback value is less than the feedback loss detection value (F09.11), the feedback loss detection time will start. If the feedback loss detection time (F09.12) is reached, the inverter reports a PID feedback loss fault (E.PIDE).

# 6.11 Wobble, step length and count value (F10 group)

| | | | |
|---|---|---|---|
| F10.00 | Jump frequency 1 | Setting range: 0.00 ～ F00.06Hz | Default value: 0.00Hz |

| | | | |
|---|---|---|---|
| F10.01 | Jump frequency 2 | Setting range: 0.00 ～ F00.06Hz | Default value: 0.00Hz |
| F10.02 | Jump frequency amplitude | Setting range: 0.00 ～ F00.06Hz | Default value: 0.00Hz |

In order to avoid the mechanical resonance point, you can set the jump frequency range of the inverter. When the inverter set frequency falls within the jump frequency, it will automatically adjust to the upper or lower limit of the jump frequency range.

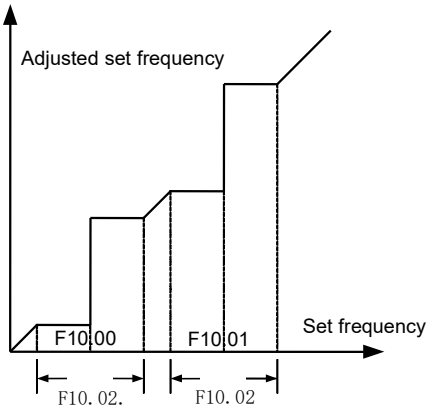



Figure 6-16 Jump frequency adjustment

| | | | |
|---|---|---|---|
| F10.03 | Wobble amplitude | Setting range: 0.0～100.0% | Default value: 0.0% |
| F10.04 | Saltation frequency amplitude | Setting range: 0.0～50.0% | Default value: 0.0% |
| F10.05 | Wobble rise time | Setting range: 0.1～3000.0s | Default value: 5.0s |
| F10.06 | Wobble down time | Setting range: 0.1～3000.0s | Default value: 5.0s |

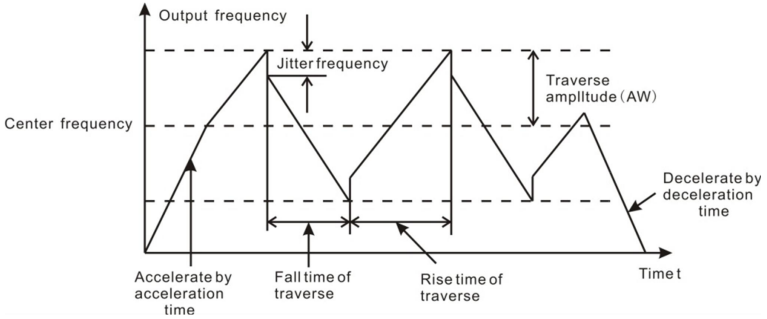



Figure 6-17 Wobble running

Wobble function indicates that the inverter output frequency takes the set frequency in the center and wobbles up and down.

F10.03 is used to calculate the wobble amplitude. Wobble amplitude = F10.03 * set frequency.

F10.04 is used to calculate the sudden jump amplitude. Sudden jump amplitude = F10.04 * wobble amplitude.

F10.05 The time required for the lower limit of the wobble frequency increasing to the upper limit of the wobble frequency.

F10.06 The time required for the upper limit of the wobble frequency decreasing to the lower limit of the wobble frequency.

| | | | |
|---|---|---|---|
| F10.07 | Set count value | Setting range: F10.08～65535 | Default value: 0 |
| F10.08 | Designated count value | Setting range: 0～F10.07 | Default value: 0 |

The count value inputs pulse signal counting via the counter of the multi-function digital input terminal.

When the pulse input terminal is set to F10.07, T1 or T2 outputs an indication signal.

When the count value reaches the designated count value, the digital output terminal outputs the signal indicating the arrival of the count value, and the counter is cleared and continues counting when the next pulse arrives.

The designated count value F10.07 should be larger than the preset count value F10.08. For example, F10.08 = 3, F10.07 = 7;

This function is shown in the figure (rising edge triggers counting):

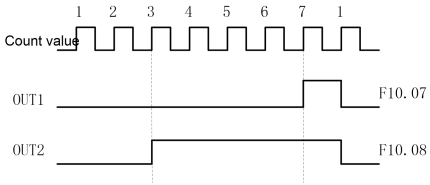



Figure 6-18 Designated count value and preset count value

# 6.12 Multi-step speed and PLC (F11 group)

Simple PLC function can enable the inverter change its output frequency and directions automatically according to preset running time. For multi-step speed function, the output frequency can be changed only by multi-step terminals.

| | | | |
|---|---|---|---|
| F11.00 | Multi-step speed command 0 | Setting range: -100.0 ～ 100.0% | Default value: 0.0% |
| F11.01 | Multi-step speed command 1 | Setting range: -100.0 ～ 100.0% | Default value: 0.0% |
| F11.02 | Multi-step speed command 2 | Setting range: -100.0 ～ 100.0% | Default value: 0.0% |
| F11.03 | Multi-step speed command 3 | Setting range: -100.0 ～ 100.0% | Default value: 0.0% |
| F11.04 | Multi-step speed command 4 | Setting range: -100.0 ～ 100.0% | Default value: 0.0% |
| F11.05 | Multi-step speed command 5 | Setting range: -100.0 ～ 100.0% | Default value: 0.0% |
| F11.06 | Multi-step speed command 6 | Setting range: -100.0 ～ 100.0% | Default value: 0.0% |
| F11.07 | Multi-step speed command 7 | Setting range: -100.0 ～ 100.0% | Default value: 0.0% |
| F11.08 | Multi-step speed command 8 | Setting range: -100.0 ～ 100.0% | Default value: 0.0% |
| F11.09 | Multi-step speed command 9 | Setting range: -100.0 ～ 100.0% | Default value: 0.0% |

| | | | |
|---|---|---|---|
| F11.10 | Multi-step speed command 10 | Setting range: -100.0 ～ 100.0% | Default value: 0.0% |
| F11.11 | Multi-step speed command 11 | Setting range: -100.0 ～ 100.0% | Default value: 0.0% |
| F11.12 | Multi-step speed command 12 | Setting range: -100.0 ～ 100.0% | Default value: 0.0% |
| F11.13 | Multi-step speed command 13 | Setting range: -100.0 ～ 100.0% | Default value: 0.0% |
| F11.14 | Multi-step speed command 14 | Setting range: -100.0 ～ 100.0% | Default value: 0.0% |
| F11.15 | Multi-step speed command 15 | Setting range: -100.0 ～ 100.0% | Default value: 0.0% |

The multi-step speed input terminal (refer to F06 group) selects the multi-step speed setting, ON means the terminal is valid, and OFF indicates that the terminal is invalid.

| **Multi-step speed command terminal 4** | **Multi-step speed command terminal 3** | **Multi-step speed command terminal 2** | **Multi-step speed command terminal 1** | **Multi-step speed setting** |
|---|---|---|---|---|
| OFF | OFF | OFF | OFF | Multi-step speed command 0 |
| OFF | OFF | OFF | ON | Multi-step speed command 1 |
| OFF | OFF | ON | OFF | Multi-step speed command 2 |
| OFF | OFF | ON | ON | Multi-step speed command 3 |
| OFF | ON | OFF | OFF | Multi-step |

| | | | | |
|---|---|---|---|---|
| | | | | speed command 4 |
| OFF | ON | OFF | ON | Multi-step speed command 5 |
| OFF | ON | ON | OFF | Multi-step speed command 6 |
| OFF | ON | ON | ON | Multi-step speed command 7 |
| ON | OFF | OFF | OFF | Multi-step speed command 8 |
| ON | OFF | OFF | ON | Multi-step speed command 9 |
| ON | OFF | ON | OFF | Multi-step speed command 10 |
| ON | OFF | ON | ON | Multi-step speed command 11 |
| ON | ON | OFF | OFF | Multi-step speed command 12 |
| ON | ON | OFF | ON | Multi-step speed command 13 |
| ON | ON | ON | OFF | Multi-step speed command 14 |
| ON | ON | ON | ON | Multi-step speed |

| | | | | |
|---|---|---|---|---|
| | | | | command 15 |

Table 6-3 Multi-step speed command terminals

| F11.16 | PLC work mode | Setting range: 0～2 | Default value: 0 |
|---|---|---|---|

0: stop after a single run

The inverter stops automatically after completing a single cycle and it cannot start until it receives a run command.

1: run at the final value after a single run

The inverter maintains the last running frequency and direction automatically after completing a single cycle.

2: circulate to run

The inverter will automatically start the next cycle after completing a single cycle and it will not stop until it receives a stop command.

| F11.17 | PLC power failure memory | Setting range: 0～1 | Default value: 0 |
|---|---|---|---|

0: disabled

1: enabled

PLC power failure memory is to memorize the running stage and frequency before power failure.

| F11.18 | PLC restart mode | Setting range: 0～1 | Default value: 0 |
|---|---|---|---|

0: Re-run

1: Continue running at the interrupted frequency.

| F11.19 | ACC/DEC time selection of PLC step 0～7 | Setting range: 0x0000～0xFFFF | Default value: 0x00 |
|---|---|---|---|
| F11.20 | ACC/DEC time selection of PLC step 8～15 | Setting range: 0x0000～0xFFFF | Default value: 0x00 |

Details are as follows:

| **Binary** | **Stage** | **ACC/DEC time 0** | **ACC/DEC time 1** | **ACC/DEC time 2** | **ACC/DEC time 3** |
|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| BIT1 | BIT0 | 0 | 00 | 01 | 10 | 11 |
| BIT3 | BIT2 | 1 | 00 | 01 | 10 | 11 |
| BIT5 | BIT4 | 2 | 00 | 01 | 10 | 11 |
| BIT7 | BIT6 | 3 | 00 | 01 | 10 | 11 |
| BIT9 | BIT8 | 4 | 00 | 01 | 10 | 11 |
| BIT11 | BIT10 | 5 | 00 | 01 | 10 | 11 |
| BIT13 | BIT12 | 6 | 00 | 01 | 10 | 11 |
| BIT15 | BIT14 | 7 | 00 | 01 | 10 | 11 |
| BIT1 | BIT0 | 8 | 00 | 01 | 10 | 11 |
| BIT3 | BIT2 | 9 | 00 | 01 | 10 | 11 |
| BIT5 | BIT4 | 10 | 00 | 01 | 10 | 11 |
| BIT7 | BIT6 | 11 | 00 | 01 | 10 | 11 |
| BIT9 | BIT8 | 12 | 00 | 01 | 10 | 11 |
| BIT11 | BIT10 | 13 | 00 | 01 | 10 | 11 |
| BIT13 | BIT12 | 14 | 00 | 01 | 10 | 11 |
| BIT15 | BIT14 | 15 | 00 | 01 | 10 | 11 |

After selecting the corresponding ACC and DEC time, transform the combined 16-bit binary into 4-bit hexadecimal and input the corresponding function codes.

| | | | |
|---|---|---|---|
| F11.21 | PLC running time unit | Setting range: 0～1 | Default value: 0 |

0: second (s)

1: min (min)

| | | | |
|---|---|---|---|
| F11.22 | Running time of step 0 | Setting range: 0.0～6553.5s(h) | Default value: 0.0s(h) |
| F11.23 | Running time of step 1 | Setting range: 0.0～6553.5s(h) | Default value: 0.0s(h) |
| F11.24 | Running time of step 2 | Setting range: 0.0～6553.5s(h) | Default value: 0.0s(h) |
| F11.25 | Running time of step 3 | Setting range: 0.0～6553.5s(h) | Default value: 0.0s(h) |
| F11.26 | Running time of step 4 | Setting range: 0.0～6553.5s(h) | Default value: 0.0s(h) |

| | | | |
|---|---|---|---|
| F11.27 | Running time of step 5 | Setting range: 0.0～6553.5s(h) | Default value: 0.0s(h) |
| F11.28 | Running time of step 6 | Setting range: 0.0～6553.5s(h) | Default value: 0.0s(h) |
| F11.29 | Running time of step 7 | Setting range: 0.0～6553.5s(h) | Default value: 0.0s(h) |
| F11.30 | Running time of step 8 | Setting range: 0.0～6553.5s(h) | Default value: 0.0s(h) |
| F11.31 | Running time of step 9 | Setting range: 0.0～6553.5s(h) | Default value: 0.0s(h) |
| F11.32 | Running time of step 10 | Setting range: 0.0～6553.5s(h) | Default value: 0.0s(h) |
| F11.33 | Running time of step 11 | Setting range: 0.0～6553.5s(h) | Default value: 0.0s(h) |
| F11.34 | Running time of step 12 | Setting range: 0.0～6553.5s(h) | Default value: 0.0s(h) |
| F11.35 | Running time of step 13 | Setting range: 0.0～6553.5s(h) | Default value: 0.0s(h) |
| F11.36 | Running time of step 14 | Setting range: 0.0～6553.5s(h) | Default value: 0.0s(h) |
| F11.37 | Running time of step 15 | Setting range: 0.0～6553.5s(h) | Default value: 0.0s(h) |

## 6.13 485 communication (F12 group)

CT100 inverter supports the international Modbus protocol and RTU format.

| | | | |
|---|---|---|---|
| **F12.00** | **Local address** | **Setting range: 1～247** | **Default value: 1** |

Set the local communication address: 0 for the broadcast address, 1～247 for slave address.

| F12.01 | Baud rate | Setting range: 0～5 | Default value: 4 |
|---|---|---|---|

0: 1200bps

1: 2400bps

2: 4800bps

3: 9600bps

4: 19200bps

5: 38400bps

| F12.02 | Data check | Setting range: 0～5 | Default value: 1 |
|---|---|---|---|

Define the data format for Modbus:

0: no check (N, 8,1) for RTU

1: even check (E, 8,1) for RTU

2: odd check (O, 8,1) for RTU

3: no check (N, 8,2) for RTU

4: even check (E, 8,2) for RTU

5: odd check (O, 8,2) for RTU

| F12.02 | Data format | Data bit | Check method | Stop bit |
|---|---|---|---|---|
| 0 | RTU | 8 | No check N | 1 |
| 1 | RTU | 8 | Even check E | 1 |
| 2 | RTU | 8 | Odd check O | 1 |
| 3 | RTU | 8 | No check N | 2 |
| 4 | RTU | 8 | Even check E | 2 |
| 5 | RTU | 8 | Odd check O | 2 |

Table 6-4 Modbus data format

| | | | |
|---|---|---|---|
| F12.03 | Response delay | Setting range: 0～200ms | Default value: 5ms |

Set the delay time when the inverter responses it after receiving the data of the master.

| | | | |
|---|---|---|---|
| F12.04 | Communication timeout detection time | Setting range: 0 .0s , 0.1～100.0s | Default value: 0.0 |

When the function code is set to 0.0s, the communication timeout fault is invalid.

When the function code is non-zero, if the response of the serial communication is not received within the set time, the inverter reports E.485 fault.

| | | | |
|---|---|---|---|
| F12.05 | Communication timeout error handling | Setting range: 0～3 | Default value: 1 |

0: alarm and coast to stop

1: no alarm and continue running

2: no alarm and stop according to stop mode (communication mode is valid)

3: no alarm and stop according to stop mode (all control modes are valid)

| | | | |
|---|---|---|---|
| F12.06 | Communication processing actuation selection | Setting range: 0～0x11 | Default value: 0x00 |

LED ones

0: write with response

1: write without response

LED tens

0: set value unsaved after power off

1: set value saved after power off

# 6.14 Auxiliary functions (F13 group)

| | | | |
|---|---|---|---|
| F13.00 | Jogging frequency | Setting range: 0.00 ～ F00.06 | Default value: 5.00Hz |
| F13.01 | Jogging running ACC | Setting range: 0.0 ～ | Default value: |

| | | | |
|---|---|---|---|
| | time | 3000.0s | 20.0s |
| F13.02 | Jogging running DEC time | Setting range: 0.0 ～ 3000.0s | Default value: 20.0s |

F13.00: the set frequency for jogging running.

F13.01: the time it takes for the output frequency of the inverter increasing from zero frequency to the maximum frequency F00.06.

F13.02: the time it takes for the output frequency of the inverter decreasing from the maximum frequency F00.06 to zero frequency.

Note: The operating priority is as follows: forced deceleration > jogging running > multi-step speed running > normal frequency running.

| | | | |
|---|---|---|---|
| F13.03 | ACC time 1 | Setting range: 0.0 ～ 3000.0s | Default value: 20.0s |
| F13.04 | DEC time 1 | Setting range: 0.0 ～ 3000.0s | Default value: 20.0s |
| F13.05 | ACC time 2 | Setting range: 0.0 ～ 3000.0s | Default value: 20.0s |
| F13.06 | DEC time 2 | Setting range: 0.0 ～ 3000.0s | Default value: 20.0s |
| F13.07 | ACC time 3 | Setting range: 0.0 ～ 3000.0s | Default value: 20.0s |
| F13.08 | DEC time 3 | Setting range: 0.0 ～ 3000.0s | Default value: 20.0s |

ACC time 1/2/3 is the same as ACC time 0 and DEC time 1/2/3 is same as DEC time 0. You can select the corresponding ACC/DEC time by ACC/DEC time selection 1 and 2.

| | | | |
|---|---|---|---|
| F13.09 | Emergency stop DEC time (reserved) | Setting range: 0.0 ～ 3000.0s | Default value: 1.0s |

The DEC time is used when the inverter receives an “emergency stop deceleration” signal from the input terminal, the time it takes for the output frequency of the inverter decreasing from the maximum frequency F00.06 to zero frequency. The inverter is decelerated to 0 and then it stops. This function is

forced deceleration switch.

| | | | |
|---|---|---|---|
| F13.10 | FDT level detection value | Setting range: 0.00 ～ F00.06 | Default value: 50.00Hz |
| F13.11 | FDT lag detection | Setting range: 0.0 ～ 100.0% | Default value: 5.0% |

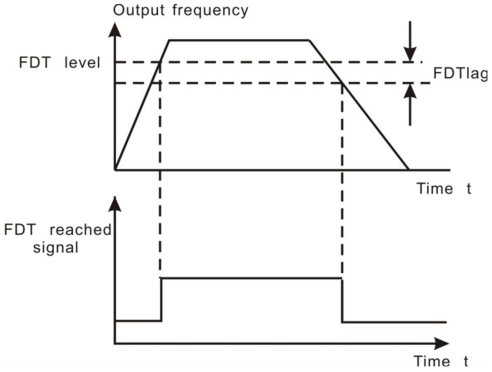



Figure 6-19 Relationship between output frequency and FDT output

The FDT output is valid when the output frequency reaches the FDT level detection value (F13.10) during the frequency increasing.

The FDT output is invalid when the output frequency is less than or equal to the FDT lag frequency f_delay during the frequency decreasing.

F_delay = FDT level detection value * (100% - FDT lag detection value).

| | | | |
|---|---|---|---|
| F13.12 | Frequency arrival detection amplitude | Setting range: 0.0～100.0% | Default value: 0.0 |

This function is used to detect the deviation of the output frequency and the set frequency. The deviation between the output frequency of the inverter and the set frequency is within the setting range of the function code. The frequency arrival terminal (refer to F06 group) output is valid.

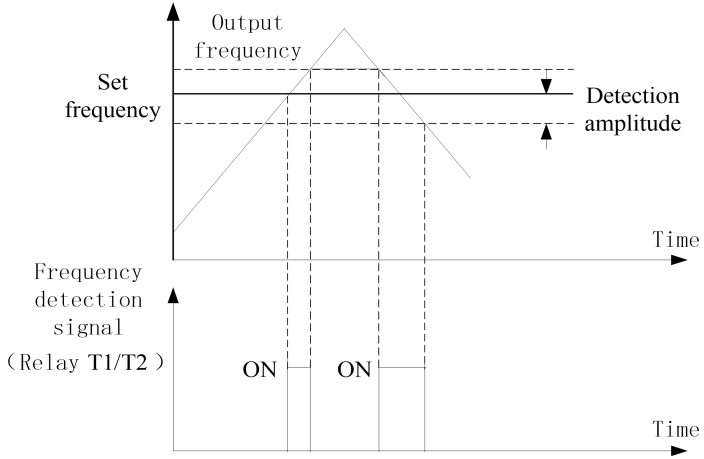



Figure 6-20 FDT level

| | | | |
|---|---|---|---|
| F13.13 | Droop control | Setting range: 0.00 ～ 10.00Hz | Default value: 0.0 |

When several motors drive the same load, each motor's load is different because of the difference of motor's rated speed. The load of different motors can be balanced through droop control function which makes the speed droop along with load increasing.

| | | | |
|---|---|---|---|
| F13.14 | Braking threshold voltage | Setting range: 115.0 ～ 140.0% | Default value: 130% |

This function sets the threshold voltage of energy consumption brake, 100.0% corresponds to the standard bus voltage (inverter rated voltage * 1.414). When the bus voltage is larger than the threshold voltage, the energy consumption brake starts and the value can be adjusted for effective energy consumption brake of the load.

| | | | |
|---|---|---|---|
| F13.15 | Overmodulation function | Setting range: 0～1 | Default value: 0 |

0: invalid

1: valid

This function is used when the grid voltage is low or the inverter is at heavy load for a long term. The inverter can increase the output voltage by adjusting the bus voltage utilization rate. When the voltage is overmodulated, the output current

harmonics will increase slightly.

| | | | |
|---|---|---|---|
| F13.16 | Running mode of cooling fan | Setting range: 0～1 | Default value: 0 |

0: Normal running mode

1: Power up running

| | | | |
|---|---|---|---|
| F13.17 | Set running time | Setting range: 0～65535 | Default value: 0 |

## 6.15 Reserved functions (F14 group)

| | | | |
|---|---|---|---|
| F14.00～F14.09 | Reserved | / | / |

## 6.16 Factory parameters (F15 group)

| | | | |
|---|---|---|---|
| F15.00 | Factory password | Setting range: 0～65535 | Default value: **** |

# 7 Faults and solutions

## 7.1 Common faults and solutions

The inverter may have following faults during running. Please refer to the following methods for simple fault analysis:

### 7.1.1 No display after power on

Check that the inverter input power is consistent with the rated voltage of the inverter. If there is a problem with the power supply, please check and remove.
Check whether the three-phase rectifier bridge is intact. If the rectifier bridge is damaged, please ask for service.
Check if the POWER LED is on. If the LED is off, the rectifier bridge or the buffer resistor may be damaged. If the LED is on, the switching power supply may be damaged. Please ask for service.

### 7.1.2 Automatic power off after power on:

Check whether there is grounded or short circuited among the input power sources.

Check whether the rectifier bridge has been broken down, if damaged, ask for service.

When the inverter runs, the power supply automatically trips; check the input leakage protector.

Check whether there is a short circuit between the output modules. If yes, please ask for service.

Check whether there is a short circuit or ground between the motor leads.

If the trip occasionally occurs and the distance between the motor and the inverter is relatively far, consider adding the output AC reactor.

### 7.1.3 The motor does not rotate after the inverter is running

Check whether there is a balanced three-phase output between U, V and W. If yes, the motor cable or the motor is damaged, or the motor stalled due to mechanical causes.

There may be three-phase output but unbalanced. The drive board or output

module may be damaged, please ask for service.

If there is no output voltage, the drive board or output module may be damaged, please ask for service.

## 7.2 Fault information and solutions

When the inverter has fault in use, refer to the fault codes and fault states of F08.16～F08.23.

Table 7-1 Troubleshooting list

| Code | Type | Reason | Solution |
|---|---|---|---|
| E.oC1 | ACC running overcurrent | 1. The acceleration is too fast<br>2. The grid voltage is too low<br>3. The inverter power is too small | 1. Increase the ACC time<br>2. Check the input power<br>3. Select the inverter of larger power |
| E.oC2 | DEC running overcurrent | 1. The deceleration is too fast<br>2. Load inertia torque is too large<br>3. The inverter power is too small | 1. Increase the DEC time<br>2. Add the appropriate energy consumption braking components<br>3. Select the inverter of larger power |
| E.oC3 | Constant speed running overcurrent | 1. Load sudden change or abnormal<br>2. The grid voltage is too low<br>3. The inverter power is too small | 1. Check load or decrease load sudden change<br>2. Check the input power<br>3. Select the inverter of larger power |
| E.oU1 | ACC running overvoltage | 1. The input voltage is abnormal<br>2. After instantaneous power failure, restart the rotating motor | 1. Check the input power<br>2. Avoid restart at stop |
| E.oU2 | DEC running overvoltage | 1. The deceleration is too fast<br>2. The load inertia is too large<br>3. The input voltage is abnormal | 1. Increase the DEC time<br>2. Add the appropriate energy consumption braking components<br>3. Check the input power |

| Code | Type | Reason | Solution |
|---|---|---|---|
| E.oU3 | Constant speed running overvoltage | 1. The input voltage has changed abnormally<br>2. The load inertia is too large | 1. Install the input reactor<br>2. Add the appropriate energy consumption braking components |
| E.Lv | Bus undervoltage | The grid voltage is too low | Check the grid input power |
| E.oUT1 | Converter unit U-phase fault | 1. The acceleration is too fast<br>2. The internal IGBT is damaged<br>3. Interference causes malfunction<br>4. The grounding is good | 1. Increase the ACC time<br>2. Ask for service<br>3. Check if the peripheral devices have a strong interference source |
| E.oUT2 | Converter unit V-phase fault | | |
| E.oUT3 | Converter unit W-phase fault | | |
| E.oL1 | Motor overload | 1. The grid voltage is too low<br>2. The motor rated current is not set correctly<br>3. Motor stall or load sudden change<br>4. Motor power is much larger than load power | 1. Check the grid voltage<br>2. Reset the motor rated current<br>3. Check the load and adjust the torque boost<br>4. Select the appropriate motor |
| E.oL2 | Inverter overload | 1. The acceleration is too fast<br>2. Restart the rotating motor<br>3. The grid voltage is too low<br>4. The load is too large | 1. Reduce the acceleration speed<br>2. Avoid restart at stop<br>3. Check the grid voltage<br>4. Select the inverter of larger power |
| E.oL3 | Overload pre-warning | 1. The load is too heavy<br>2. The motor parameters are not correct during vector control<br>3. The grid voltage is too low | 1. Select a larger inverter<br>2. Carry out motor rotation autotuning<br>3. Check the grid voltage |
| E.oH1 | Rectifier module overheating | 1. Instantaneous overcurrent of the inverter | 1. Refer to overcurrent solutions<br>2. Redistribution |

| Code | Type | Reason | Solution |
|---|---|---|---|
| E.oH2 | Converter module overheating | 2. Phase or ground short circuit of output three phases<br>3. The duct is blocked or the fan is damaged<br>4. The ambient temperature is too high<br>5. The wiring or connectors of the control board is loose<br>6. The auxiliary power supply is damaged and the drive voltage is undervoltage<br>7. The power module bridge is conducted<br>8. The control board is abnormal | 3. Dredge the duct or replace the fan<br>4. Reduce the ambient temperature<br>5. Check and reconnect<br>6. Ask for service<br>7. Ask for service<br>8. Ask for service |
| E.ILF | Input phase loss | Input R, S, T phase loss | 1. Check the input power<br>2. Check the installation and wiring |
| E.OLF | Output phase loss | 1. Output U, V, W phase loss<br>2. Serious asymmetry of load three-phase | 1. Check the output wiring<br>2. Check the motor and cable |
| E.bC | Braking unit fault | 1. Braking wiring fault or braking tube damaged<br>2. The external braking resistance is too small | 1. Check the braking unit and replace a new braking tube<br>2. Increase the braking resistance |
| E.AUT | Motor autotuning fault | 1. The motor capacity does not match with the inverter capacity<br>2. Incorrect setting of motor rating parameters<br>3. The deviation between autotuning parameters and standard parameters is too large<br>4. Autotuning timeout | 1. Replace the drive model<br>2. Set the rated parameters according to the motor name plate<br>3. Make the motor at no load and re-identification<br>4. Check the motor wiring and parameters setting |

| Code | Type | Reason | Solution |
|---|---|---|---|
| E.PIDE | PID feedback disconnection | 1.PID feedback disconnection<br>2.PID feedback source disappears | 1. Check the PID feedback signal cable<br>2. Check the PID feedback source |
| E.485 | Communication fault | 1. Incorrect baud rate setting<br>2. Communication error when using serial communication<br>3. Communication interruption for a long time | 1. Set the appropriate baud rate<br>2. Press the STOP/RESET key to reset and ask for service<br>3. Check the wiring of communication interfaces |
| E.EF | External fault | SI external fault input terminal operation | 1. Check the external device input |
| E.EEP | EEPROM read and write fault | 1. Control parameters read and write error<br>2.EEPROM damaged | 1. Press the STOP/RESET key to reset and ask for service<br>2. Ask for service |
| E.END | Running time arrival | User trial time arrival | Ask for service |
| E.ITE | Current detection circuit fault | 1. The connector of the control board is in poor connection<br>2. The auxiliary power supply is damaged<br>3. Hall device is damaged<br>4. Amplifier circuit is abnormal | 1. Check the connector and reconnect<br>2. Ask for service<br>3. Ask for service<br>4. Ask for service |

Tips: If you cannot perform troubleshooting according to the above solutions, please contact our after-sales service department.

# 8 Daily maintenance

The environmental temperature, humidity, salt mist, dust, cotton or vibration may cause the faults of the inverter. In order to prevent the faults of the inverter and make it run smoothly in high-performance for a long time, you must check the inverter periodically.

Note: The maintenance personnel must follow the specified maintenance methods.

Only qualified technicians can carry out maintenance.

During maintenance, the power supply of the inverter must be cut off, the power LED is off or the DC bus voltage is less than 36VDC.

## 8.1 Daily maintenance

Table 8-1 Daily maintenance

| Check item | Check content | Method | Criterion |
|---|---|---|---|
| Environment | Temperature | Thermometer | -10℃～50℃ |
| | Humidity | Hygrometer | 5%～95%, no condensation |
| | Dust, cotton, oil | See | No dust or cotton |
| | Vibration | Feel | No abnormal vibration |
| Inverter | Noise | Hear | No abnormal noise |
| | Odor | Smell | Odorless |
| | Appearance | See | No defect or deformation |
| | Temperature | Feel | No abnormal heating |
| | Fan | See | Air duct without block, normal air flow and no noise |
| Motor | Temperature | Feel | No abnormal heating |
| | Odor | Smell | odorless |
| | Noise | Hear | No abnormal noise |
| | Vibration | Feel | No abnormal vibration |
| Running status parameters | Inverter input current | Ammeter | The parameters meet the requirements of the specifications. |
| | Inverter input | Voltmeter | |

| Check item | Check content | Method | Criterion |
|---|---|---|---|
| | voltage | | |
| | Inverter output current | Ammeter or displayed parameters | |
| | Inverter output voltage | Voltmeter or displayed parameters | |
| | Rectifier bridge, converter module temperature | F05.13 and F05.14 | The difference between displayed temperature and ambient temperature is not more than 40℃. |

## 8.2 Periodic maintenance

Table 8-2 Periodic (three months) maintenance

| Check item | Check content | Method |
|---|---|---|
| Control terminal screws | Whether the screws are loose | Tighten |
| Main circuit terminal screws | Whether the screws are loose | Tighten |
| Grounding terminal screws | Whether the screws are loose | Tighten |
| PCB board | Dust or sundries | Clean up sundries with dry compressed air |
| Fan | Abnormal noise and vibration, the cumulative time is more than 20,000 hours | 1. Clean up sundries<br>2. Replace the fan |
| Electrolytic capacitor | Whether to change color, with or without smell | Replace the electrolytic capacitor |
| Radiator | Dust or sundries | Clean up sundries with dry compressed air |
| Power components | Dust or sundries | Clean up sundries with dry compressed air |

## 8.3 Replacement of wear parts

The inverter fan and electrolytic capacitor are easy to be damaged. In order to ensure the inverter runs safely without faults for a long term, you need to replace the wear parts periodically. The replacement time for wear parts is as follows:

◆ Fan: it needs to be replaced after using more than 20,000 hours

◆ Electrolytic capacitor: it needs to be replaced after using 30,000 to 40,000 hours

## 8.4 Storage of the inverter

The storage environment should meet the following conditions:

Table 8-3 Storage environment

| Category | Storage environment |
|---|---|
| Temperature | -40℃～70℃ |
| Humidity | 5%～95%, no condensation |
| Surroundings | No direct sunlight, dust, corrosive gases or vibration (can be sealed with plastic bags and desiccant) |

**Note:** Long-term storage may cause electrolytic capacitor degradation. The electrolytic capacitor should be energized once in 2 years and the rated voltage should rise slowly by the regulator.

# 9 Communication protocol

The CT100 series inverters provide RS485 communication interface. You can realize centralized control via PC/PLC (set the run commands and function parameters of the inverter, read the work state and fault information of the inverter) to meet the specific requirements.

1. Content

The serial communication protocol defines the content and format of the transmission information for serial communication, including master polling (or broadcast) format, master encoding method including the required function codes, transmission data and error check. The slave response also uses the same structure including actuation confirmation, return data and error check. If an error occurs when the slave receives information or the slave cannot complete the actuation required by the master, it will feedback a response of fault information to the master.

2. Application mode

The inverter has access to "single- master multi-slaves" PC/PLC control network with RS485 bus.

Support Modbus protocol and RTU format; broadcast address is 0 and slave address can be set to 1~247.

3. Bus structure

(1) interface mode

RS485 (CT100 terminals: 485 + and 485-) hardware interface

(2) transmission mode

Asynchronous serial, half duplex transmission. At the same time, only one can send data and the other can receive data for the master and the slave. Data in the serial asynchronous communication process, in the form of a message, can be sent one by one frame.

(3) topology structure

Single-master multi-slaves network, the slave address in the network must be unique.

4. Description of the protocol

CT100 series inverter communication protocol is an asynchronous serial master-slave Modbus communication protocol and only one device (master) in the network can establish a protocol (called "query/command"). Other devices (slaves) can only provide data to respond to the master's "query/command" or make the corresponding actuation according to the master's "query/command".

The master refers to a personal computer (PC), an industrial control device or a programmable logic controller (PLC), etc. The slave is CT100 inverter. The master can communicate with a single slave as well as send a broadcast message to all slaves. For the master's single "query/command", the slave has to return a message (called a response), for the master's broadcast message, the slaves do not need to respond to the master.

5. Communication data format

The Modbus protocol communication data format of CT100 series inverters is as follows:

In RTU mode, the minimum interval time should be at least 3.5 bytes for message transmission, which is the easiest way to achieve a variety of character time at the baud rate. The first transmitted field is the device address. The transmitted characters can be hexadecimal 0...9 and A...F. The network device constantly detects the network bus, even during the interval time. When the first field (address field) is received, the corresponding device decodes next transmitting character. After the last transmitting character, the interval time of at least 3.5 bytes marks the end of the message. A new message can start after this pause.

The whole message frame is a continuous transmitting flow. If there is an interval time of more than 1.5 bytes before the frame is completed, the receiving device will renew the uncompleted message and assume that the next byte is the address field of a new message. As such, if the new message follows the previous message within the interval time of 3.5 bytes, the receiving device will deal with it as the same with the previous message. If these two phenomena all happen during the transmission, the CRC will generate a fault message to respond to the sending devices.

RTU frame format

| | |
|---|---|
| START | Interval time of 3.5 bytes |
| ADR | Communication address: 1～247 |
| CMD | 03: read slave parameters; 06: write slave parameters |
| DATA (N-1) | Function parameter address, function parameter number, function parameter value etc. |
| DATA (N-2) | |
| …… | |
| DATA (0) | |
| CRC CHK low bit | Detection value: CRC |
| CRC CHK high bit | |

| END | Interval time of 3.5 bytes |
|---|---|

CMD (command instruction) and DATA

Command code: 03H, read N words (at most 16 words can be read)

For example: the baud rate 19200bps, even check (E, 8,1) for RTU, read continuous two data from the inverter F06.19 with the slave address of 01.

Master command message

| ADR | 01H |
|---|---|
| CMD | 03H |
| High bit of start address | 06H (Function code group) |
| Low bit of start address | 13H (Function code bit) |
| High bit of register number | 00H |
| Low bit of register number | 02H |
| Low bit of CRC CHK | 35H |
| High bit of CRC CHK | 46H |

Slave response message

| ADR | 01H |
|---|---|
| CMD | 03H |
| The number of bytes | 04H |
| High bit of F06.19 data | 00H |
| Low bit of F06.19 data | 00H |
| High bit of F06.20 data | 03H |
| Low bit of F06.20 data | E8H |
| Low bit of CRC CHK | FAH |
| High bit of CRC CHK | 8DH |

Command code: 06H, write a word

For example: the baud rate 19200bps, even check (E, 8,1) for RTU, write 40.00Hz (communication without decimal point) (0FA0H) to F00.09H address of the inverter whose slave address is 02H, and change the keypad set frequency to 40.00Hz.

Master command message

| ADR | 02H |
|---|---|
| CMD | 06H |
| High bit of F00.09 address | 00H (Function code group) |
| Low bit of F00.09 address | 09H (Function code bit) |
| High bit of F00.09 data | 0FH |

| | |
|---|---|
| Low bit of F00.09 data | A0H |
| Low bit of CRC CHK | 5CH |
| High bit of CRC CHK | 73H |

Slave response message

| | |
|---|---|
| ADR | 02H |
| CMD | 06H |
| High bit of F00.09 address | 00H (Function code group) |
| Low bit of F00.09 address | 09H (Function code bit) |
| High bit of F00.09 data | 0FH |
| Low bit of F00.09 data | A0H |
| Low bit of CRC CHK | 5CH |
| High bit of CRC CHK | 73H |

Check mode-CRC (Cyclical Redundancy Check) check

The checkout uses RTU frame format. The frame includes the frame error detection field which is based on the CRC calculation method. The CRC field is two bytes including 16 figure binary values. It is added into the frame after calculated by transmitting device. The receiving device recalculates the CRC of the received frame and compares them with the value in the received CRC field. If the two CRC values are different, there is an error in the communication.

Using the RTU frame format, the message includes an error detection field based on the CRC method. The CRC field detects the contents of the entire message. The CRC field is two bytes and contains a 16-bit binary value. It is added to the message by the transmission device. The receiving device recalculates the CRC of the received message and compares it with the value in the received CRC field. If the two CRC values are not equal, the transmission has an error.

During CRC, 0*FFFF will be stored. And then, deal with the continuous 6-above bytes in the frame and the value in the register. Only the 8Bit data in every character is effective to CRC, while the start bit, the end and the odd and even check bit is ineffective.

The calculation of CRC applies the international standard CRC checkout principles. When you are editing CRC calculation, you can refer to the relative standard CRC calculation to write the required CRC calculation program.

Here provided a simple function of CRC calculation for the reference (programmed with C language)

unsigned int crc_cal_value(unsigned char*data_value,unsigned char data_length)

```
{
int i;
unsigned int crc_value=0xffff;
while(data_length--)
{
crc_value^=*data_value++;
for(i=0;i<8;i++)
{
if(crc_value&0x0001)
crc_value=(crc_value>>1)^0xa001;
else
crc_value=crc_value>>1;
}
}
return(crc_value);
}
```

Fault message response

The slave uses functional code fields and fault addresses to indicate it is a normal response or some error occurs (named as objection response). For normal responses, the slave shows corresponding function codes, digital address or sub-function codes as the response. For objection responses, the slave returns a code which equals the normal code, but the first byte is logic 1.

For example: when the master sends a message to the slave, requiring it to read a group of address data of the inverter function codes, there will be following function codes:

0 0 0 0 0 0 1 1 (hexadecimal 03H)

For normal responses, the slave responds the same function codes, while for objection responses, it will return:

1 0 0 0 0 0 1 1 (hexadecimal 83H)

Besides the function codes modification for the objection fault, the slave will respond a byte of abnormal code which defines the error reason.

When the master receives the response for the objection, in a typical processing, it will send the message again or modify the corresponding order.

Error code and meaning

| Modbus abnormal code | | |
|---|---|---|
| **Code** | **Name** | **Meaning** |
| 01H | Illegal command | The command from master cannot be executed. This command is only for new version and this version cannot realize. Slave is in fault state and cannot execute it. |
| 02H | Illegal data address | Some of the operation addresses are invalid or not allowed to access. Especially the combination of the register and the transmitting bytes are invalid. |
| 03H | Illegal value | When there are invalid data in the message framed received by slave. Note: This error code does not indicate the data value to write exceed the range, but indicate the message frame is an illegal frame. |
| 06H | The slave is busy | Inverter is busy (EPPROM is in storage) |
| 10H | Password error | The password written to the password check address is not the same as the password set by P7.00. |
| 11H | Check error | In the frame message sent by the upper monitor, the length of the digital frame is incorrect or the counting of CRC check bit in RTU is different from the lower monitor. |
| 12H | Invalid parameter change | It only happens in write command. The written data exceeds the parameter range. The parameter should not be modified now. The terminal has already been used. |
| 13H | The system is locked | When the upper computer is reading or writing and the user password is set without password unlocking, it will report that the system is locked. |

Address definition of communication parameters

It is used to control the inverter operation, inverter status and related parameter settings.

Read and write function parameters (some function codes cannot be changed, only for manufacturers to use):

The rules of parameter address of the function codes:

High byte: group number before the radix point of the function code (00～15) Group 0 to Group 15

Low byte: the number after the radix point (00～FF)

For example, the parameter address of F13.17 is 0D11H.

Note: Some parameters cannot be changed when the inverter is in the running state and some parameters cannot be changed in any state. The setting range, unit and relative instructions should be paid attention to when modifying the function code parameters. Besides, EEPROM is stored frequently, which may shorten the usage time of EEPROM. Some functions are not necessary to be stored on the communication mode. The needs can be met on by changing the value in RAM. Changing the high bit of the function code from 0 to 1 can also realize the function. The corresponding function code address is as follows:

High byte: 00～0F

Low byte: 00～FF

For example, F03.12 is not stored in EEPROM, the address is 830CH; the address can only write RAM and cannot read, read for the invalid address.

485 communication address

| Function instruction | Address definition | Data meaning instruction | R/W characteristics |
|---|---|---|---|
| Communication control command | 1000H | 0001H: forward running | W/R |
| | | 0002H: reverse running | |
| | | 0003H: stop | |
| | | 0004H: coast to stop (emergency stop) | |
| | | 0005H: fault reset | |
| | | 0006H: forward jogging | |
| | | 0007H: reverse jogging | |
| | | 0008H: jogging stop | |
| Inverter status | 1001H | 0001H: forward running | R |
| | | 0002H: reverse running | |
| | | 0003H: stop | |
| | | 0004H: fault | |

| | | | |
|---|---|---|---|
| | | 0005H: -E.Lv- status | |
| The address of the communication setting value | 2000H | Communication set frequency (-10000～10000, 10000 corresponds to 100.00%, -10000 corresponds to -100.00%) | W/R |
| | 2001H | Torque set value (-1000～1000, 1000 corresponds to 100.0%) | |
| | 2002H | Upper limit frequency setting (0～Fmax, unit: 0.01Hz) | W/R |
| | 2003H | PID reference (0～1000, 1000 corresponds to 100.0%) | W/R |
| | 2004H | PID feedback (0～1000, 1000 corresponds to 100.0%) | W/R |
| The address of the running/stopping parameter | 3000H | Running frequency (0～Fmax, unit 0.01Hz) | R |
| | 3001H | Set frequency (0～Fmax, unit 0.01Hz) | R |
| | 3002H | Output current (0.0～3000.0, unit 0.1A) | R |
| | 3003H | Output voltage (0～1200V, unit 1V) | R |
| | 3004H | Running speed (0～65535, unit 1RPM) | R |
| | 3005H | Bus voltage (0～2000.0, unit 0.1V) | R |
| | 3006H | Output power (-300.0～300.0%, unit 0.1%, 100% corresponds to motor rated power) | R |
| | 3007H | Output torque (-250.0～250.0%, unit 0.1%, 100% corresponds to motor rated torque) | R |

| | | | |
|---|---|---|---|
| | 3008H | Input terminal status (000 to 0FF, unit 01H) | R |
| | 3009H | Output terminal status (00 to 0F, unit 01H) | R |
| | 300AH | Analog AI1 (0.00～10.00V, unit 0.01V) | R |
| | 300BH | Analog AI2 (-10.00～10.00V, unit 0.01V) | R |
| | 300CH | High speed pulse HDI (0.00～50.00kHz, unit 0.01kHz) | R |
| | 300DH | PID set value (0～1000, 1000 corresponds to 100.0%) | R |
| | 300EH | PID feedback value (0～1000, 1000 corresponds to 100.0%) | R |
| | 300FH | PLC and current step of multi-step speed (0～0xFFFF) | R |
| | 3010H | External count value (0～65535) | R |
| | 3011H | Torque set value (-200.0～200.0%, unit 0.1%) | R |
| | 3012H | Fault code (0～25) | R |
| | 3013H | Device code (100H) | R |
| | 3014H | Reserved | R |
| | 3015H | Reserved | R |
| | 3016H | Reserved | R |